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DEVICE FOR HEATING TABLETS OF RESINOUS MOLDING COMPOSITIONS

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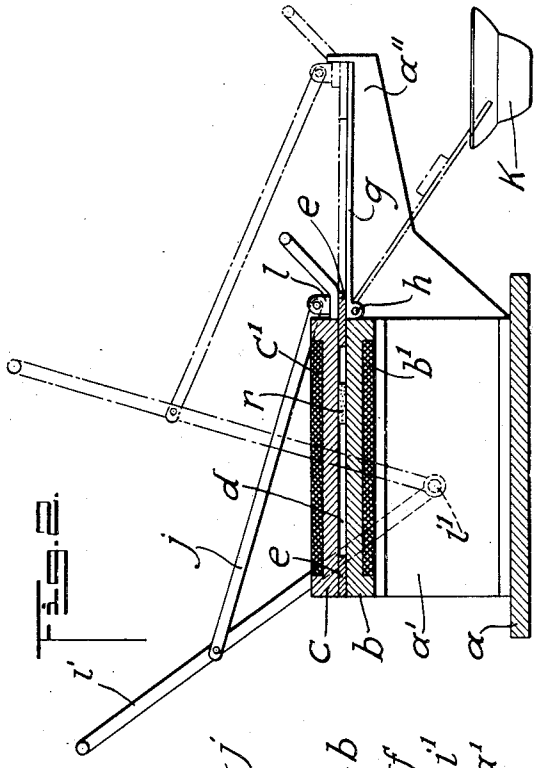


Fig. 2.

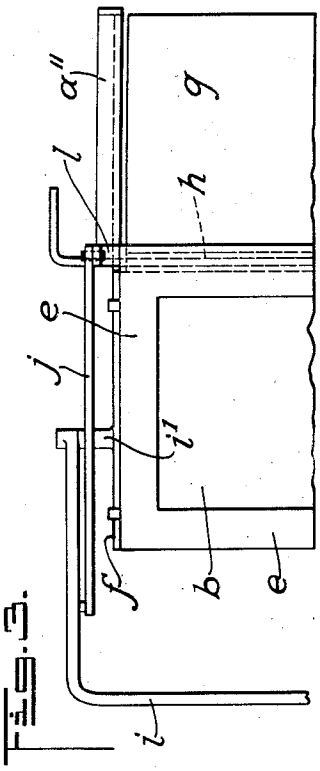


Fig. 3.

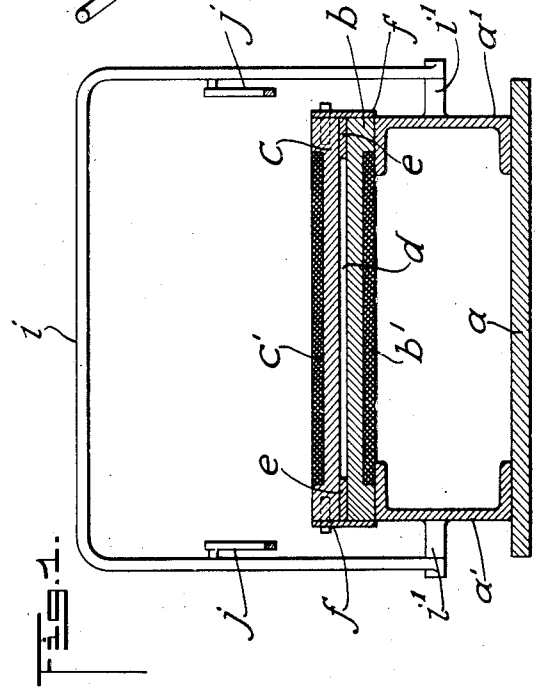


Fig. 1.

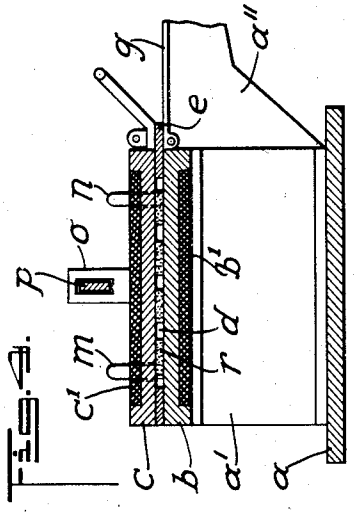


Fig. 4.

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DEVICE FOR HEATING TABLETS OF RESINOUS MOLDING COMPOSITIONS

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5 Claims. (Cl. 219—19)

The invention relates to devices for heat treating tablets of resinous molding compositions previous to the hot pressing of these compositions.

A known expedient for facilitating the hot molding of resinous compositions consists in tableting or briquetting the composition, that is, in pre-shaping the material into the form of discs by the mere application of pressure. It is further known to preheat resinous molding compositions either as a powder or in the form of the above-mentioned tablets previous to the hot pressing proper in order to shorten the time during which the composition must be left in the mold. The preheating treatment above referred to is usually done by placing the composition in heating chambers of relatively large volume within which the heat is transferred to the resinous substance mainly by heat radiation. Since with such a heating method an even increase of the temperatures throughout the interior of the substance cannot be relied upon, care must be exercised to prevent a local overheating of the substance. Therefore, the temperature must be kept at a relatively low value so that the heating occurs slowly enough to ensure a gradual progress of the reaction. Such a method is not only critical, but may also have a disadvantageous influence on the further working up of the material, especially on the products obtained by the final hot molding of the resinous substance.

An object of the present invention is to avoid the drawbacks of the known devices for heating resinous tablets or briquettes previous to the hot pressing proper. More particularly, the invention aims at increasing the temperature of the pre-treatment and at diminishing the time necessary for such treatment without impairing the desired qualities of the resinous composition. Another object of the invention is to provide a preheating device of simple and reliable construction. An object, further, is to obtain a simple mode of operation of the heating device so that, for instance, the person operating the pressing machine or handling the press molds, has no difficulty in also effecting the preheating of the tablets, if desired.

The invention utilizes a conception gained from numerous experiments according to which a considerable increase in the preheating temperature is possible if the tablets are heated conductively so as to assume this temperature rapidly and evenly. It has been found that treating the tablets in this way allows reduction of the hot molding period and also improves the final product.

The device according to the invention contains two metallic heating plates between which a narrow heating chamber is formed, the width of which is just sufficient to allow inserting the tablets to be preheated. A slidable frame structure resting on a support or table in front of the heating chamber is designed to be moved into the heating chamber in order to transport the tablets placed on the table into the chamber and to remove them from the chamber after the heat treatment is finished. According to the invention, the above-mentioned table may be provided with means for easily discharging the tablets into a collecting container or the like after the tablets have been removed from the chamber.

On account of the fact that the heating surfaces of the narrow chamber are arranged in close proximity to the tablets, the supply of heat from these surfaces to the tablets occurs considerably more rapidly and evenly than in the known devices. Since the tablets while being heated rest upon one of the heating surfaces, the heat supplied by this surface is furnished to the tablet by heat conductivity. Although the heating surface above the tablets may be arranged a slight distance away from the top surface of the tablets, this distance is so small that the heat transfer, though occurring by radiation, is considerably more effective than in the known voluminous preheating cabinets. In further contrast to the known heating devices, the heat radiation from the upper heating surface may be increased by heating the upper heating plate more than the lower plate. In this case it is possible to make the quantity of heat furnished from the upper heating surface virtually equal to the heat supplied by conductivity from the lower surface on which the tablets rest.

However, the invention may also be realized by making the distance between the heating plates adjustable so that after having placed the tablets in the heating chamber, the upper plate is lowered until it touches the tablets. Now the transfer of heat from the upper heating plate also is mainly by heat conductivity. The adjustment of the distance between the heating plates may be effected by hand or by means of a mechanical connection with the device for transporting the tablets from the aforementioned table into the heating chamber, so that only one operation is necessary to feed the tablets to the heating device and to bring the upper heating surface into contact with the tablets.

The invention will more easily be understood from the following description of two embodi-

ments of the invention illustrated in the accompanying drawing, in which

Fig. 1 illustrates a part-sectional front view of a heating device;

Fig. 2 shows the same device in a part-sectional side view,

Fig. 3 shows a partial top view of the device represented by Figs. 1 and 2, while

Fig. 4 illustrates a part-sectional front view of a second embodiment in which the distance between the two heating plates is variable.

In all the figures identical reference characters are used for indicating similar elements.

The heating device illustrated by Figs. 1, 2 and 3, contains a base structure composed of a base plate *a*, two side walls *a'*, and two supporting arms *a''*. Two metallic heating plates *b* and *c* are mounted on this base structure and are held in proper position relative to each other by means of side plates *f* mounted on plate *c*. Each of the two heating plates is provided with an electric heating unit, *b'* and *c'*, respectively. The heating surfaces of the plates *b* and *c* face each other so that a narrow interstitial heating chamber *d* is formed which extends horizontally. The height of the heating chamber is only slightly greater than that of the tablets or briquettes to be heated. A table *g* is arranged in front of the heating chamber and has its supporting surface in alignment with the heating surface of the lower plate *b*. The table *g* is mounted on the base structure of the device by means of a hinge *h* so that it forms a flap which may be tilted downward, as shown in Fig. 2 by broken lines, in order to discharge the tablets from the table surface into a collecting container *k*. A frame *e* fitting into the narrow heating chamber is arranged in such a way that it may be moved out of the heating chamber onto the table *g*. A handle *i* journalled about stationary pivots *i'* is connected with the frame *e* by means of two coupling rods *j* engaging a cross-bar *l* connected with the frame. When moving the handle *i* from the position shown in Fig. 2 by solid lines, into the position shown in the same figure by broken lines, the frame *e* is moved from the heating chamber onto the surface of the table *g*. The cross-bar *l* is slidably carried by the supporting arms *a''*, as will be seen from Figs. 2 and 3, so that the frame *e* retains its position when the table *g* is tilted.

The heating device above described is operated as follows: While the table *g* is in the position shown in Fig. 2 by solid lines, the frame *e* is placed on the table in the position illustrated by broken lines. The tablets or briquettes to be preheated are placed on the table *g* so as to lie within the opening of the frame *e*. Now the handle *i* is moved into the position shown in Fig. 2 by solid lines, thereby passing the frame *e* and the tablets placed therein into the heating chamber between the metal plates *b* and *c*. In Fig. 2 one tablet is indicated by *r*. After the heating treatment is finished, that is, after a certain time has elapsed, the handle *i* is returned to its original position wherein the tablets again rest on the table *g*. By now tilting the table *g*, the tablets are discharged therefrom.

As the above-described embodiment shows, the device according to the invention consists of relatively few individual elements of simple and inexpensive construction. The mode of operation of the device is extremely simple so that no particular skill or care is necessary for executing the heat treatment.

The heating device illustrated in Fig. 4 has, in general, the same construction as the above-described embodiment, except that the upper heating plate *c* is movably guided on two studs *m* and *n* allowing the plate to be raised or lowered in order to adjust the distance between the heating surfaces of the two plates. The raising or lowering may be effected by any suitable means; in Fig. 4 for instance, these means are represented by a member *o* connected with the upper plate *c* and an actuating lever *p* passing through an opening of the member *o*. By actuating the lever, the plate *c* is moved upward or downward. The frame *e* and the tablets placed therein are moved into the heating chamber while the plate *c* is in raised position. Then the plate is lowered until it rests upon the frame *e* or upon stops having the height of the tablets to be heated. After the treatment is finished, the plate *c* is raised before the frame *e* is removed from the heating chamber.

I claim:

1. A device for heating tablets of resinous molding compositions previous to the hot-molding operation, comprising two heating plates each having a plane and continuous horizontal heating surface facing the horizontal heating surface of the other plate so as to form a narrow interstitial heating chamber, said heating plates being arranged to maintain during the heating operation a fixed distance of approximately the height of the tablets to be heated, horizontal supporting means for receiving the tablets arranged adjacent to and in alignment with the heating surface of the lower heating plate, and intermittently operating transporting means movably arranged on said supporting means and designed for simultaneously moving a multitude of tablets onto and off of said heating surface of said lower plate.

2. A device for heating tablets of resinous molding compositions previous to the hot-molding operation, comprising an upper heating plate and a lower heating plate having their heating surfaces facing each other at a distance slightly greater than the height of said tablets so as to form a narrow interstitial heating chamber, each of said plates having an electric heating element designed to produce in said chamber a temperature below the final hardening temperature of said tablets, the heating element of said upper plate being adapted to heat the surface of said upper plate to a temperature higher than that of the surface of said lower plate, a table for receiving said tablets arranged in front of said plates so as to have the table surface in alignment with the heating surface of said lower plate, and reciprocating slide means for moving said tablets from said table surface onto said lower heating plate and vice versa.

3. A device for heating tablets of resinous molding compositions previous to the hot-molding operation, comprising two heating plates, each having a horizontal heating surface facing the heating surface of said other plate so as to form an interstitial heating chamber, said heating plates being arranged to maintain during the heating operation a distance slightly greater than the height of the tablets to be heated, a

table arranged adjacent to and in alignment with the surface of the lower heating plate, a slidable frame fitting into said heating chamber for moving said tablets from said table into said chamber and vice versa, said table being tiltably mounted in order to discharge said tablets.

4. A device for heating tablets of resinous molding compositions previous to the hot-molding operation, comprising two heating plates each having a plane and continuous heating surface facing the heating surface of the other plate so as to form a horizontal interstitial heating chamber, said plates being arranged to maintain during the heating operation a constant distance, means for relatively adjusting said plates to adapt said distance to the height of said tablets, supporting means having a table surface in alignment with the heating surface of the lower heating plate, and means for moving tablets from said table surface onto the heating surface of said lower plate.

5. A device for heating tablets of resinous molding compositions previous to the hot-molding operation, having two horizontal heating surfaces facing each other so as to form an interstitial narrow heating chamber, means for relatively adjusting said plates to adapt the distance between said heating surfaces to the height of the tablets to be heated, said means being designed for maintaining said distance constant during the heating operation, a table arranged adjacent to and in alignment with the lower of said heating surfaces, a movable frame designed to move the tablets to be heated from said table onto said lower heating surface and vice versa, and means for permitting said table to be tilted in order to discharge said tablets.

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