March 13, 1945. J. FELBER 2,371,161

SHEET TREATING MACHINE

Filed May 1, 1943 4 Sheets-Sheet 1

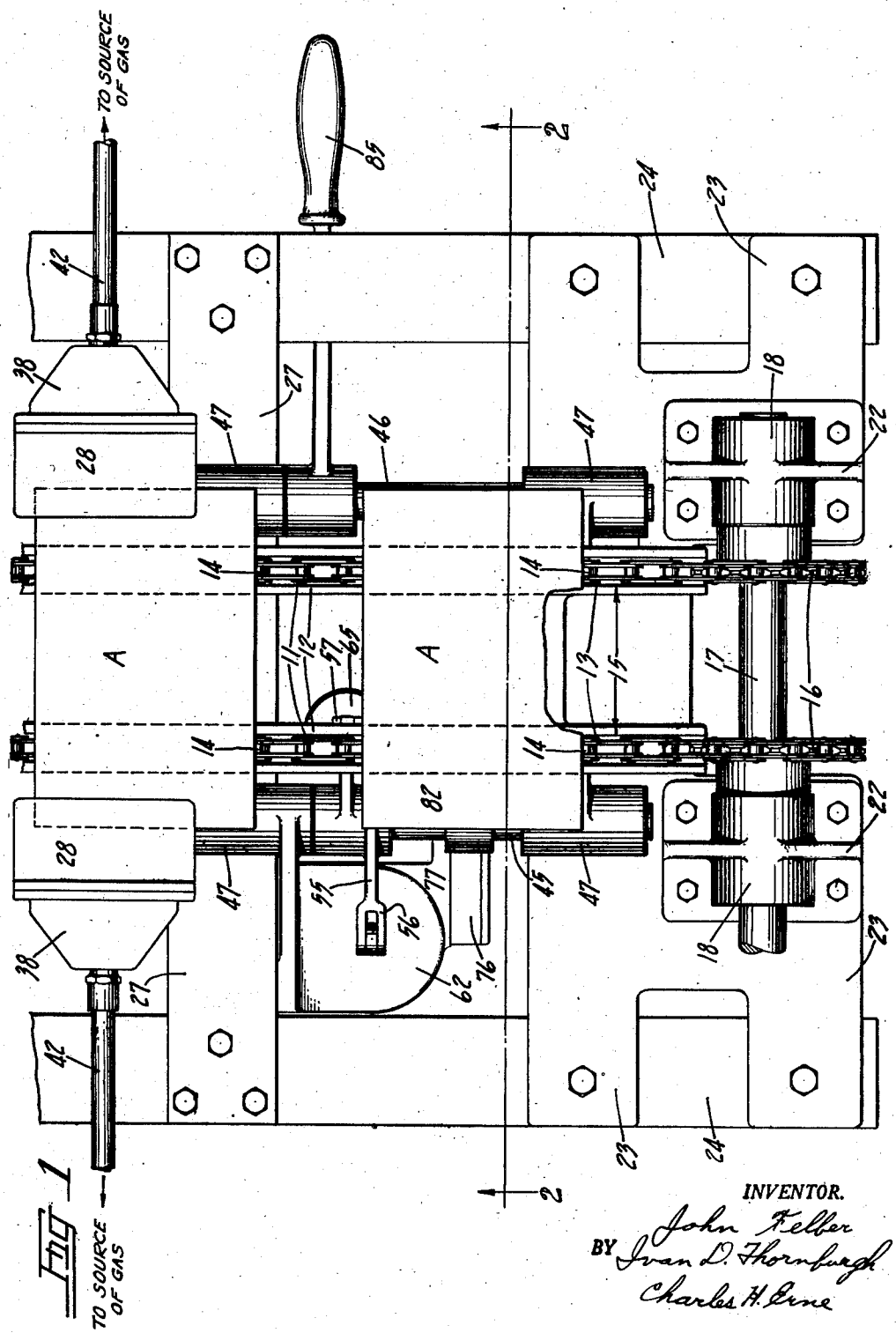


Fig. 1

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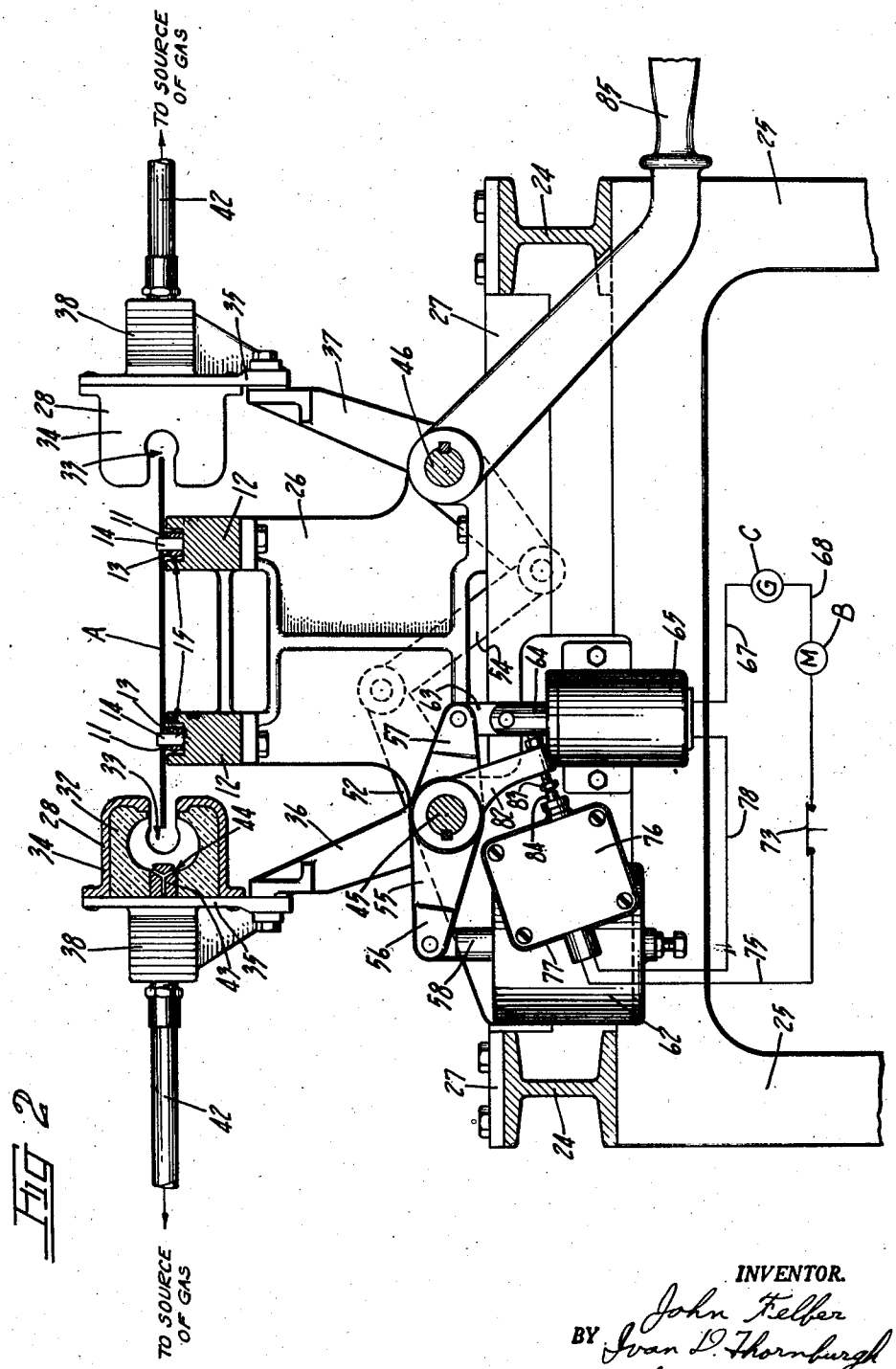


FIG 2

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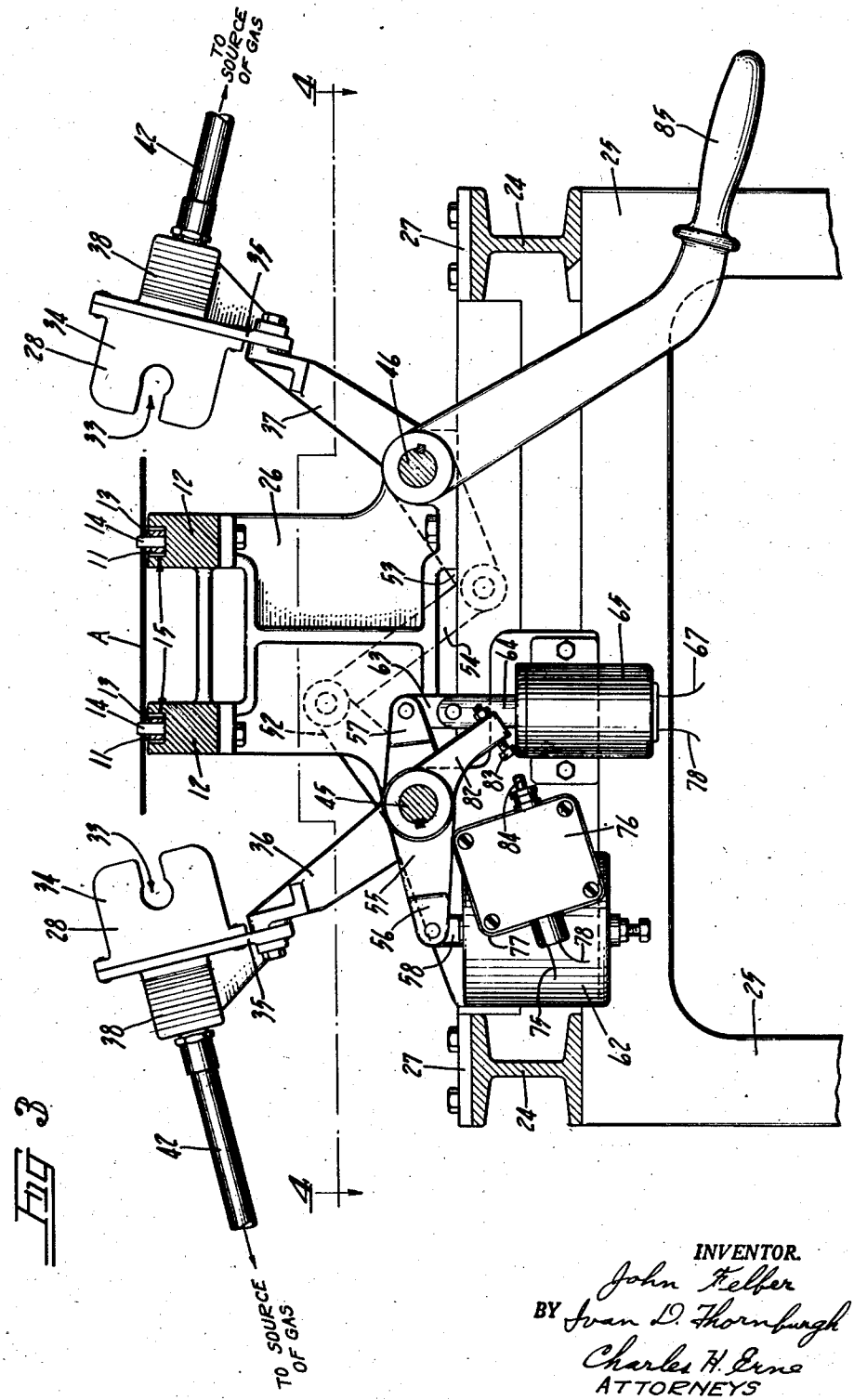


Fig 3

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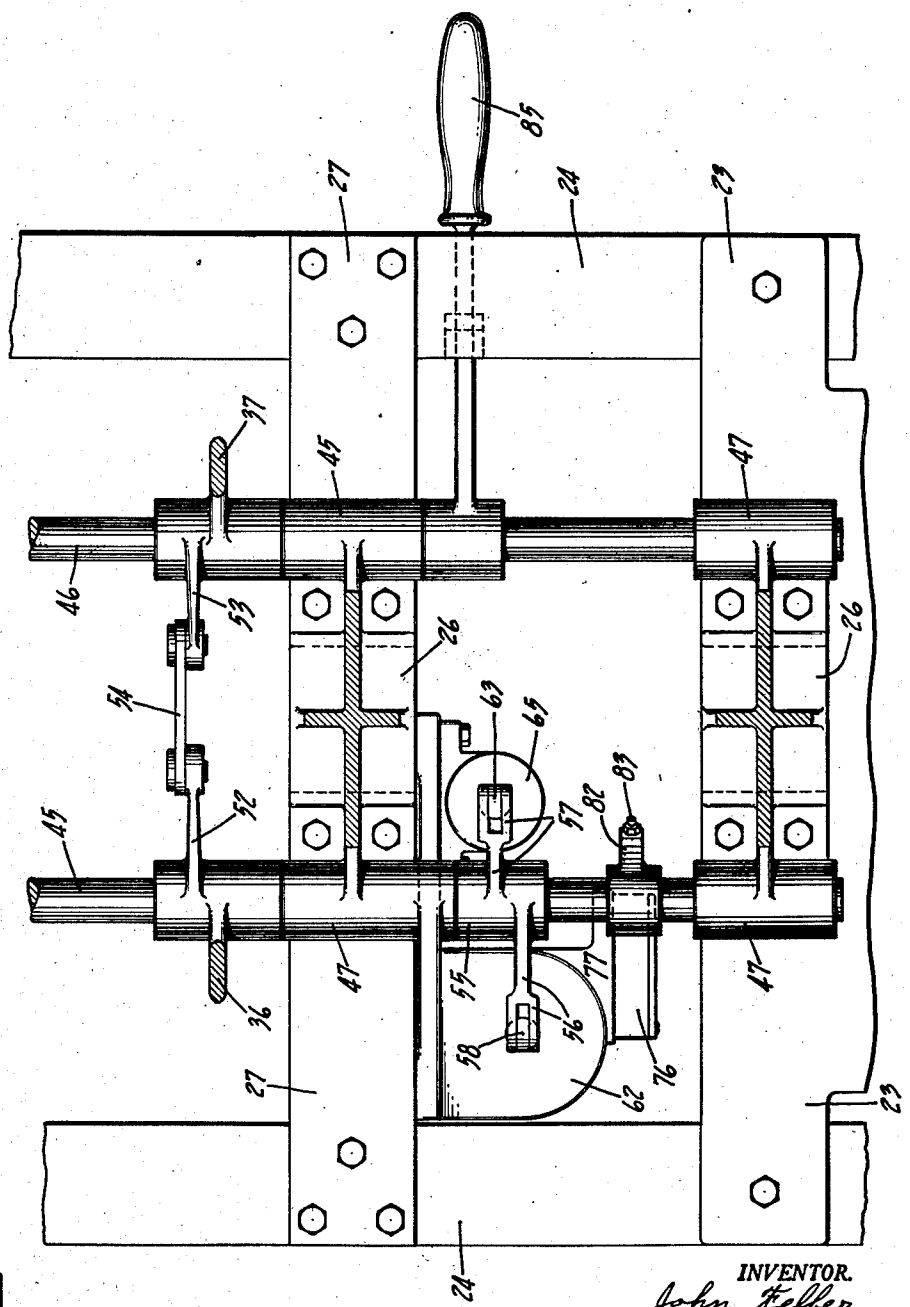


Fig 4

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UNITED STATES PATENT OFFICE

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SHEET TREATING MACHINE

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Application May 1, 1943, Serial No. 485,401

10 Claims. (Cl. 263—3)

This invention relates to a machine for heat treating sheet material and the like moving along a path of travel and has particular reference to movable heating elements located adjacent the path of travel of the sheets for heating edge portions thereof and having devices for shifting the heating elements away from the sheets to prevent overheating them when the machine stops operating.

An object of the invention is the provision in a machine for heat treating the marginal edge portions of sheet or blank material, of devices including heating elements disposed adjacent the path of travel of the moving sheets for directing a heating medium against marginal edge portions of the sheets or blanks, wherein the devices shift the heating elements away from the sheets when the latter stop moving to prevent burning the sheets.

Another object is the provision in such a heat-treating machine, of automatically actuated lever arms for supporting and holding the heating elements in operative position to heat the moving sheets as the machine is operated and for rapidly shifting the heating elements, under cushioned control, to an inoperative position when the movement of the sheets is stopped and in which position the heating elements are maintained until the normal operations of the machine are restored.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a fragmentary plan view of a heat-treating machine embodying the invention, with parts broken away;

Fig. 2 is a transverse vertical section as viewed substantially along the line 2—2 in Fig. 1 and showing heating elements in position adjacent the path of travel of the moving sheets for heating their edge portions during normal operations of the machine;

Fig. 3 is a view similar to Fig. 2 showing the heating elements and certain other parts in a different position as when the machine is stopped; and

Fig. 4 is a horizontal sectional plan view taken substantially along the broken lines 4—4 in Fig. 3, with parts broken away.

As a preferred embodiment of the instant invention the drawings disclose a machine in which metal or fibre sheet blanks A are subjected to a heat treatment prior to being formed into can or container bodies. Such a treatment may be used for drying metallic sheets or blanks that previously have been deoxidized and washed or otherwise treated along their edge portions in any well known or preferred manner.

For fibrous sheets or blanks, particularly such as those which have thermoplastic adhesive on their edge portions, the present machine is well adapted to render such adhesive tacky, preparatory to bonding the edge portions together as in a side seam, the actual joining of the edges being performed in an adjacent or subsequently operating machine.

The blanks or sheets A to be treated preferably are fed individually and in timed relation from a supply of such material or from an adjacent machine which for the purpose of this invention need not be shown. The individual sheets are supported in a horizontal position on a continuously operating conveyor 11 (Fig. 1) and are advanced along a table 12 toward the discharge end of the machine.

The conveyor 11 includes a pair of spaced and parallel endless chains 13, each having a plurality of spaced feed fingers 14 (Fig. 1) for advancing the sheets. The chains travel in synchronism through guide channels 15 formed in the top of the table 12 (Figs. 1, 2 and 3). These chains operate on chain sprockets 16 located at opposite ends of the machine. One pair of such chain sprockets may serve as driving sprockets for the conveyor.

One pair of the chain sprockets 16 is illustrated at the entrance end of the machine and these sprockets are mounted on a shaft 17 journaled in bearings 18 of brackets 22, carried on a cross frame 23. There are two shafts 17 and two cross frames 23 disposed one each at each end of the machine. The shaft 17 shown in the drawings may be driven in any suitable manner, preferably by an electric motor B indicated in the wiring diagram. The cross frames are mounted on main frame rails 24 which extend longitudinally of the machine and are bolted to leg frames 25 disposed at each end of the machine.

The table 12 is carried on a pair of brackets 26 mounted on the cross frames 23 and on a cross rail 27 bolted to the two main frame rails 24 (Figs. 2, 3 and 4). This table thus supports the conveyor 11 for advancing the blanks A continuously in a horizontal plane along their path of travel through the machine so that the opposite edge portions of the sheets extend out-

wardly beyond the table for receiving a heat treatment.

Heat treating of the blank edges is brought about by heating elements 28. The drawings show two of these heating elements located one on each side of the machine (Figs. 1, 2 and 3). Each element comprises a horseshoe-shaped ceramic body 32 disposed so that the edge portions of the advancing sheets pass through an opening 33 in the body while the machine is operating (Fig. 2). Each ceramic body is carried in a casing 34 which is secured to a bracket 35 bolted to one of a pair of lever arms 36, 37.

Each bracket 35 is formed with a boss 38 which engages a gas chamber for receiving gas, such as illuminating or "Kemp gas," by way of a pipe 42 one end of which is threaded into the boss 38. This pipe leads from any suitable source of supply of such gas. The gas is delivered to a burner 43 (Fig. 2) disposed in the ceramic body 32. This burner is formed with orifices 44 arranged in the shape of the letter Y and when ignited produces a gas flame that heats the inner curved surfaces of the ceramic body.

Hence as the edge portions of the advancing sheets move through the heating elements 28, the heat of the ceramic bodies 32 is radiated against both surfaces of the sheet and thus subjects these surfaces to a heating treatment. The treated sheets are discharged from the machine at its discharge end in any suitable manner.

In the event the conveyor 11 stops moving and one or more of the sheets are left disposed in a heat treating position, provision is made for shifting the heating elements outwardly and away from the sheets to prevent overheating or burning them. For this purpose the lever arms 36, 37 (Figs. 1 and 2), which carry the heating elements, are mounted on rocker shafts 45, 46 carried in bearings 47 in the table brackets 26. The levers 36, 37 are formed with rocker arms 52, 53, respectively, and these arms are connected together by a link 54 (see also Fig. 3) so that both levers and their heating elements will move in unison and in opposite directions.

The shaft 45 upon which the lever arm 36 is mounted is rocked by a crank lever 55 secured to the shaft. The crank lever has two legs 56, 57 which are forked at the ends (Fig. 4). The forked leg 56 is connected to a plunger 58 operable in a dash pot 62 formed on a web of the bracket 26.

The forked leg 57 of the crank lever 55 is connected by a link 63 to a solenoid core 64, of a normally energized solenoid 65, which is secured to a web of the bracket 26.

The solenoid is part of an electric circuit (Fig. 2) which includes a source of electric energy such as a generator C and the electric motor B hereinafter mentioned. In this circuit the solenoid is connected by a wire 67 to the generator which in turn is connected by a wire 68 to the motor B. The motor is connected by a wire 72 to one side of a normally closed push button or stop switch 73. This switch 73 is exemplary of one or more control switches which may be manually opened or may be automatically opened by a movable part of the machine when a jam occurs in the machine.

The stop switch 73 is connected by a wire 75 to a normally closed limit switch 76. The switch 76 is secured to a bracket section 77 of the dash pot 62 (Figs. 2, 3 and 4). A wire 78 connects the limit switch 76 to the solenoid and this completes the electric circuit and maintains the solenoid energized when all switches are closed.

The switch 76 is maintained in its normally closed position, while the machine operates, by a switch arm 82 which is mounted on the shaft 45 and which moves with the shaft. The outer end of this arm carries an adjustment screw 83 which engages against the movable element 84 of the switch (Fig. 2) and thus holds the switch in closed position.

When the machine is stopped, by opening of the stop switch 73 and the breaking of the circuit which stops the motor B, the solenoid 65 is immediately de-energized. Its core 64 is thereupon forced outwardly from the position shown in Fig. 2 to that shown in Fig. 3 under action of the usual spring housed within the solenoid casing. This movement of the solenoid core rocks the crank lever 55 and its shaft 45 and this shifts the lever arms 36, 37 and their heating elements 28 outwardly and away from the sheets in heating position on the conveyor 11. It is this action that prevents overheating or burning of the sheet surfaces.

Simultaneously with this movement of the lever arms 36, 37 and their rock shafts 45, 46, the limit switch 76 is opened so that the electric circuit will be maintained in its broken condition to prevent starting of the machine until the heating elements are returned to their normal heating position. Opening of this limit switch is effected by the switch arm 82 moving away from the switch element 84 when the heating elements move away from the sheets. The heating elements in moving away from the sheet operate against the resistance of the dash pot 62 hereinbefore mentioned. The dash pot slows down or cushions this movement of the heating elements and prevents sudden jar which may otherwise break or injure the ceramic bodies 32 when the elements reach the outer extent of their travel.

The heating elements remain in heated condition while the machine temporarily is stopped so that when the machine is re-started and the heating elements are shifted inwardly to their original and operative position they will be ready to immediately resume heat treating operations. The heating treatment of the sheets or blanks A, however, may be resumed only after manually restoring the heating elements into operative position. This is accomplished by raising a starting handle 85, mounted on the rock shaft 46, the shifting of the handle being from the position illustrated in Fig. 3 to that shown in Fig. 2.

In returning the heating elements 28 to their normal positions the switch arm 82 operates against the movable element 84 of the switch 76 and thus closes the switch. If the stop switch 73 is closed, the circuit will be reestablished and the motor started to continue operation of the machine. This action reenergizes the solenoid 65 and draws the core 64 down thereinto and thus holds the heating elements 28 in operative position for heat treatment of the sheets.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its

material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for heat treating the edge portion of sheet material, the combination of a support for a sheet, a movable heating element disposed adjacent said support and embracing for heating opposite furnaces of an edge portion only of a sheet disposed on said support, and means for shifting said heating element away from said support to prevent burning the sheet.

2. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets and embracing the opposite edge portions only of the sheets for heating said edge portions only thereof, and means for shifting said heating element away from the path of travel of the sheets to prevent burning the sheets.

3. In a machine for heat treating edge portions only of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets and embracing in spaced relation the opposite edge portions only of the sheets for heating said edge portions only thereof, a pivotal mounting for supporting said heating element, and means connecting with said pivotal mounting for shifting said heating element away from the path of travel of the sheets to prevent burning the sheets.

4. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating edge portions thereof, and an electric solenoid connecting with said heating element for shifting it away from the path of travel of the sheets to prevent burning.

5. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating edge portions thereof, an electric solenoid connecting with said heating element for shifting it away from the path of travel of the sheets to prevent burning the sheets, and means adjacent said heating element for cushioning the element when it is shifted away from the sheets.

6. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating edge portions thereof, an electric solenoid connecting with said heating element for shifting it away from the path of travel of the sheets to prevent burning the sheets, and a dash-pot also connecting with said heating element for cushioning the element when it is shifted away from the sheets.

7. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating the oppositely disposed edge portions only thereof, said heating element embracing in spaced relation said opposite edge portions only of the sheets, means for shifting said heating element away from the path of travel of the sheets to prevent burning the sheets when the sheet advancing means stops operating, and means operable by said heating element when it shifts away from the sheets for rendering said sheet advancing means inoperative until the heating element is returned to operating position.

8. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating oppositely disposed edge portions only thereof, said heating element embracing in spaced relation the opposite edge portions only of the sheets, means for shifting said heating element away from the path of travel of the sheets to prevent burning the sheets, and means for returning the heating element to operative position adjacent the path of travel of the sheets.

9. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a plurality of movable heating elements disposed on opposite sides of the machine adjacent the path of travel of the sheets for heating opposite edge portions only of the sheets, said heating elements embracing in spaced relation said opposite edge portions only of the sheets, pivotally mounted lever arms on opposite sides of the machine for supporting said heating elements, actuating links connecting said lever arms, and means connecting with said lever arms for shifting said heating elements away from the path of travel of the sheets to prevent burning the sheets when the sheet advancing means stop operating.

10. In a machine for heat treating edge portions of sheet material, the combination of means for advancing sheets along a predetermined path of travel, a movable heating element disposed adjacent the path of travel of the sheets for heating oppositely disposed edge portions only thereof, said heating element embracing in spaced relation said oppositely disposed edge portions only of the sheets, electric circuits including an electric switch and a source of power for operating the machine, and means for shifting said heating element away from the path of travel of the sheets to prevent burning the sheets when the machine stops operating, said switch being operable by said heating element when it shifts away from the sheets for rendering the machine inoperative until the heating element is returned to operating position.

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