Dec. 31, 1963 E. G. HACHMEISTER ETAL 3,116,393

HEAT SEALING DEVICE

Filed Oct. 4, 1961

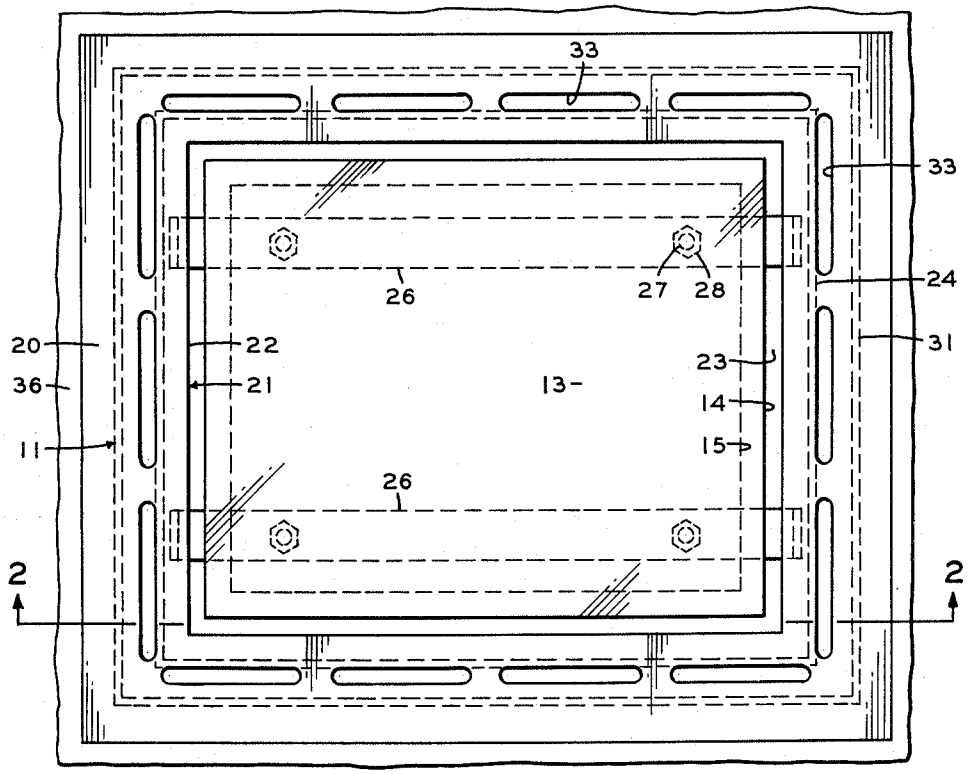


FIG. 1

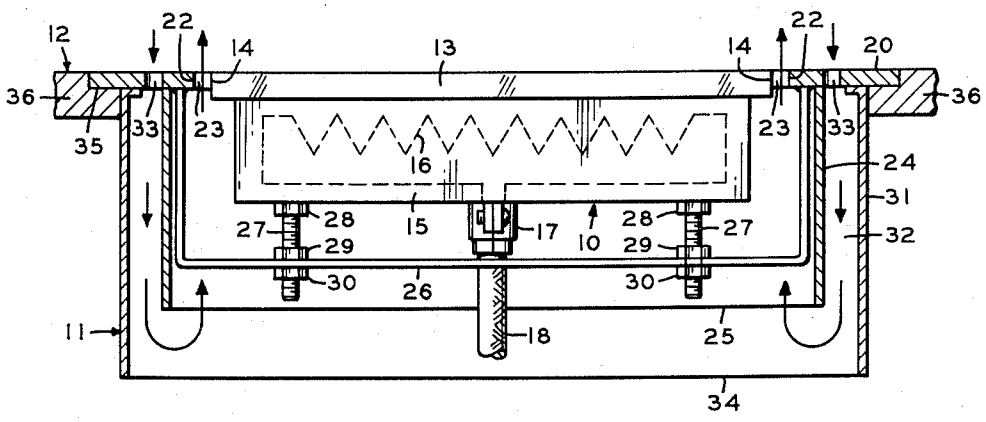


FIG. 2

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United States Patent Office 3,116,393 Patented Dec. 31, 1963

3,116,393
HEAT SEALING DEVICE

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Filed Oct. 4, 1961, Ser. No. 142,819
3 Claims. (Cl. 219—19)

This invention relates generally to improvements in a heat sealing device, and more particularly to improvements in a package sealer adapted to close the seams of a package wrapped in any thermoplastic or other heat sensitive member by the utilization of a heat sealing element.

An important objective is to provide a ventilated, flush-mounted package sealer.

It is an important object of the present invention to provide a heat sealing device that can be mounted and supported on a table section, and yet is so constructed that flammable material can be stored intentionally or otherwise under the table section adjacent to the frame of the device, and in fact in contact with the accessible external portion of such frame, without creating a fire hazard.

The above mentioned functional advantages are realized by the structural arrangement of the component parts of the frame and the relative disposition of the heater unit in the frame, whereby the frame precludes any unintentional contact with the heater unit, and whereby the external protective frame walls are cooled to an extent that any fire hazard is absolutely avoided.

An important objective is to afford a heat sealing device that can be mounted in a wood table with its heat plate substantially flush with the table top, and yet obtain the fire safety features discussed previously.

Another important object is achieved by the mounting of the heat plate on a frame and by the provision of an air passage through the frame communicating with the region occupied by the heat plate, the air flow through the air passage being induced by the thermal effects created by the plate so that the cooler air is drawn over the external frame parts and subsequently discharged through a space provided about the periphery of the heat plate.

Yet another important objective is realized by the mounting of the heater unit on the frame, yet maintaining the heating plate in peripherally spaced relation to the frame, the frame including a pair of spaced walls about the heater unit, and means providing an air passage between the walls and communicating with the region occupied by the heater unit and the space between the frame and heater plate.

Still another important object is realized by constructing the frame of a pair of tubular member arranged in concentric, spaced relation, one within the other, by mounting the heating plate within the inner tubular member in peripherally spaced relation, and by providing an inlet between the tubular members at the top of such members. The members are open and communicate at their bottom ends for the flow of air from the space between the members up through the inner tubular member and out through the peripheral space between the heat plate and inner member.

Another important object is realized by depending a pair of tubular members from a top wall located substantially coplanar with the heat plate, the top wall being adapted for mounting flush with a table section.

Other important advantages are achieved by extending the outer tubular member below the inner tubular member so as to increase the efficiency of the induced air flow and to shield the other parts of the mounting frame.

An important object is to provide a heat sealing device that is simple and durable in construction, economical

to manufacture, efficient in operation, and which can be utilized with the utmost safety.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawing in which:

FIG. 1 is a top plan view of the heat sealing device, and

FIG. 2 is a cross sectional view as seen along line 2—2 of FIG. 1.

Referring now by characters of reference to the drawing, it is seen that the heat sealing device includes a heater unit generally indicated at 10 mounted in a frame referred to at 11. This heat sealing device is usually mounted and supported in a table indicated at 12 in order to adapt the device for more effective use as a package sealer.

The heater unit 10 includes a substantially flat hot plate 13 of substantially square configuration. The hot plate 13 is maintained in a substantially horizontal position. Of course, the hot plate 13 can be of any desired configuration to suit the needs and requirements of a particular job or field of endeavor. In other words, the peripheral margin 14 of hot plate 13 is shown square in the present embodiment, but it will be readily realized that such margin 14 can be conveniently and advantageously made into any regular or irregular shape.

A cover 15 is attached to the underside of heat plate 13, the cover 15 being spaced inwardly from the peripheral plate margin 14. An electrical heating element 16 is retained within the cover 15 and is disposed in a pattern so as to distribute heat evenly to the superjacent plate 13. It will be realized that for best results in utilizing the package sealer, the heat plate 13 should be substantially the same temperature throughout the entire flat surface over which a package wrapped in a thermoplastic material is moved incident to sealing the seams of such wrapping.

Attached to the cover 15 is a fitting 17. An electrical cable 18 is retained by the fitting 17 and is operatively connected to heating element 16. The cable 18 is operatively connected to a source of electrical power (not shown) in order to energize the heating element 16.

The frame 11 includes a substantially horizontal, flat top wall 20 of substantially square configuration as viewed in FIG. 1. The top wall 20 is provided with a center opening 21 defined by a peripheral margin 22. The heat plate 13 is disposed in the center opening 21 in substantially coplanar relation to the top wall 20. Importantly, the peripheral margin 14 of heat plate 13 is maintained in spaced relation to the peripheral margin 22 of the top wall 20 so as to eliminate the possibility of any transference of heat directly from the plate 13 to the frame 11. The space 23 constitutes an outlet for an air passage that will be described and defined more fully upon later description of parts.

The space 23 is of sufficient width to permit a free flow of air upwardly around the heat plate 13, and yet is not of a width so as not to interfere with the movement of packages of all sizes along the top wall 20 onto the heat plate 13 and subsequently back onto the top wall 20. This sliding movement of packages is accomplished without requiring the package to be lifted at any time, and therefore it is seen that the space 23 is sufficiently narrow so that the package will not abut either of the margins 14 or 22 and thereby cause the package to be caught in the space 23.

A first tubular wall 24 is formed integrally with the top wall 20 and depends from wall 20 about the heater unit 10. The bottom end 25 of the first tubular wall 24 is open and is spaced below the heater unit 10. As will be apparent, the thermal effects created by the energization of the heat plate 13 will cause an up-draft through

the first tubular wall 24. This induced air will enter the open bottom end 25 of the first tubular wall 24, flow upwardly about the cover 15, and thence will be discharged to the atmosphere through the space 23 at the periphery of the heat plate 13.

A pair of U-shaped brackets 26 are disposed in supporting relation to the heater unit 10. The upper ends of the brackets 26 are fixed as by welding to underside of wall 20 and are spaced from the first tubular wall 24. A pair of bolts 27 interconnect each bracket 26 with the heater unit 10. A nut 28 fixes each bolt 27 to the cover 15, while a pair of coacting nuts 29 and 30 secure each bolt 27 to its cooperating bracket 26. Upon selectively adjusting the nuts 28–30, the height of the heater unit 10 can be varied precisely in order to maintain the top surface of plate 13 horizontal and in coplanar relation to the top surface of wall 20.

It is seen that the brackets 26 and the mounting elements 27–30 support the heater unit 10 in substantially insulated relation on the frame 11.

A second tubular wall 31 is formed integrally with the top wall 20 and depends from the top wall about the inner first wall 24. The outer second wall 31 extends downwardly for a distance below the bottom end 25 of the inner first wall 24 so as to shield the inner wall 24 and the heater unit 10 carried therein, and also to promote the inducement of air flow through the air passage previously mentioned. The outer second wall 31 is spaced laterally outward from the inner first wall 24 to provide a peripheral space 32 therebetween.

Of course, the tubular walls 24 and 31 are shown as square-shaped in a transverse plane as is seen best in FIG. 1. Again it will be noted that the tubular walls 24 and 31 together with its connected top wall 20 may be of any desired configuration, as for example, such parts could be circular or polygonal.

Provided in the top wall 20 are a plurality of elongate slots or openings 33 that communicate with the space 32 between the tubular walls 24 and 31. These slots 33 are provided about the entire periphery of the tubular walls 24 and 31 and constitute an inlet to the air passage.

Sufficient structure of the frame has now been described in detail so as to enable the air passage to be defined. Considering the flow of air through such air passage, the air enters the space 32 between walls 24 and 31 through the slots 33. This air flow continues downwardly to the bottom end 25 of the inner first wall 24, at which region, the air flow is reversed so that it flows upwardly along the interior of the inner first wall 24 about the heater unit 10. The air is discharged from this passage through the space 23 at the periphery of the heat plate 13. Because the bottom end 34 of the outer tubular wall 31 is spaced below the bottom end 25 of the inner tubular wall 24, the flow of air downwardly through the space 32 is directed into the interior of the inner wall 24 rather than escaping to the outside of the second tubular wall 31.

The top wall 20 is provided with a peripheral lip extending laterally outward from the second tubular wall 31. This lip 35 is formed substantially coplanar with the remaining portion of the top wall 20, and consequently is coplanar with the heat plate 13. The lip 35 is utilized to mount the frame 11 on the table 12.

As is usual, the table 12 is provided with an aperture into which the frame 11 is fitted, the table section 36 being provided with a recessed channel into which the lip 35 seats. The depth of the channel closely approximates the thickness of lip 35 so that the surface of table section 36 is substantially coplanar with the top wall 20.

It is thought that the operation and functional advantages of the heat sealing device has become fully apparent from the foregoing detailed description of parts, but for completeness of disclosure, the ventilated feature of this flush mounted unit will be briefly described. It will be assumed that the heater unit 10 is mounted to the first tubular wall 24 and that the frame 11 is mounted to the table section 36 in the manner previously described. The cable 18 is operatively connected to a source of electrical power and the heating element 16 is energized so as to heat the plate 13.

As plate 13 heats the surrounding atmosphere, i.e., the air immediately above the plate 13 and the volume of air contained within the first tubular wall 24, the thermal effect of such action is to cause an up-draft in the inner tubular wall 24. This up-draft immediately at the bottom end 25 of the inner tubular wall 24 induces a downdraft in the space 32 between walls 24 and 31. Consequently, cool air enters the slots 33 and moves downwardly in the space 32, thereby providing a moving flow of cool air along the surface of the outer tubular wall 31 constituting the external frame portion. The air flows along the passage and is introduced into the bottom of the inner tubular wall 24, at which point the air is moved upwardly around the heater unit 10 and is discharged at the atmosphere through the space 23 at the periphery of the heat plate 13.

The top wall 20 and the outer tubular wall 31 is cooled sufficiently by the flow of air so that the frame 10 can be safely mounted on a wooden table section 36 if desired. Moreover, material can be stored under the table section 36 close to the outer tubular wall 31 without creating any fire hazard because such wall 31 is at a greatly reduced temperature compared to the temperature of the heat plate 13 and its cover 15. This cool air flow prevents the external frame portions, that is to say the lip 35 and the outer tubular wall 31, from reaching an excessive temperature while the plate 13 and cover 15 may reach 550 degrees F.

In using the heat sealing device, a package can be wrapped in the thermoplastic material, and the package placed on the table section 36 with the overlapping seams of the material face down. Then, the package can be simply slid over the table section 36, over the top plate 20 and onto the heat plate 13. The heat from plate 13 effectively seals the seams of the thermoplastic material very quickly, allowing the package to be slid in a continuous movement off of the plate 13 and back onto the table section 36. It is seen that the device is flush mounted, and eliminates the necessity of lifting the package during this heat sealing movement.

Although the invention has been described by making detailed reference to a single preferred embodiment, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

We claim as our invention:

1. A heat sealing device comprising a flat plate, means for heating said plate, a frame having a top wall substantially coplanar with said plate, said top wall being disposed about yet spaced from the periphery of said plate, a first tubular wall depending from said top wall, a second tubular wall depending from said top wall, said tubular walls providing a space therebetween, the top wall being provided with an opening communicating with the space between said tubular walls, said tubular walls communicating at their lower ends to provide an air passage the inlet of which is the opening of the space between said tubular members and the outlet of which is the space about the plate.

2. A heat sealing device comprising a heater unit having a flat plate, means for heating said plate, a frame having a top wall substantially coplanar with said plate, said top wall being disposed about yet spaced from the periphery of said plate, a first tubular wall depending from said top wall, means supporting the heater unit on said frame, a second tubular wall depending from said top wall, said tubular walls providing a space therebetween, the top wall being provided with an opening communicating with the space between said tubular walls, the second tubular wall extending a distance below the first tubular wall, said tubular walls communicating at their lower

ends to provide an air passage the inlet of which is the opening to the space between said tubular walls and the outlet of which is the space about the plate.

3. A heat sealing device comprising a flat plate, means for heating said plate, a frame having a substantially horizontal top wall substantially coplanar with said plate, said top wall being provided with an opening the peripheral margin of which is located about yet spaced from the periphery of said plate, a first tubular wall depending from said top wall, said first tubular wall being open at the bottom, means supporting the plate on said frame, a second tubular wall depending from said top wall, said tubular walls providing a space therebetween, said second tubular wall being open at the bottom and extending a distance below said first tubular wall to protect and preclude blockage of the open bottom of said first tubular wall, said top wall being provided with a plurality of openings communicating with the space between said tubular walls, said openings being arranged about the periphery of said walls, said tubular walls providing an air passage the inlet of which are the openings to the space between said tubular walls and the outlet of which is the space about the plate.

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