Feb. 26, 1952 P. A. SIPLE 2,586,873

HEAT INSULATING RECEPTACLE

Filed June 22, 1950 2 SHEETS—SHEET 1

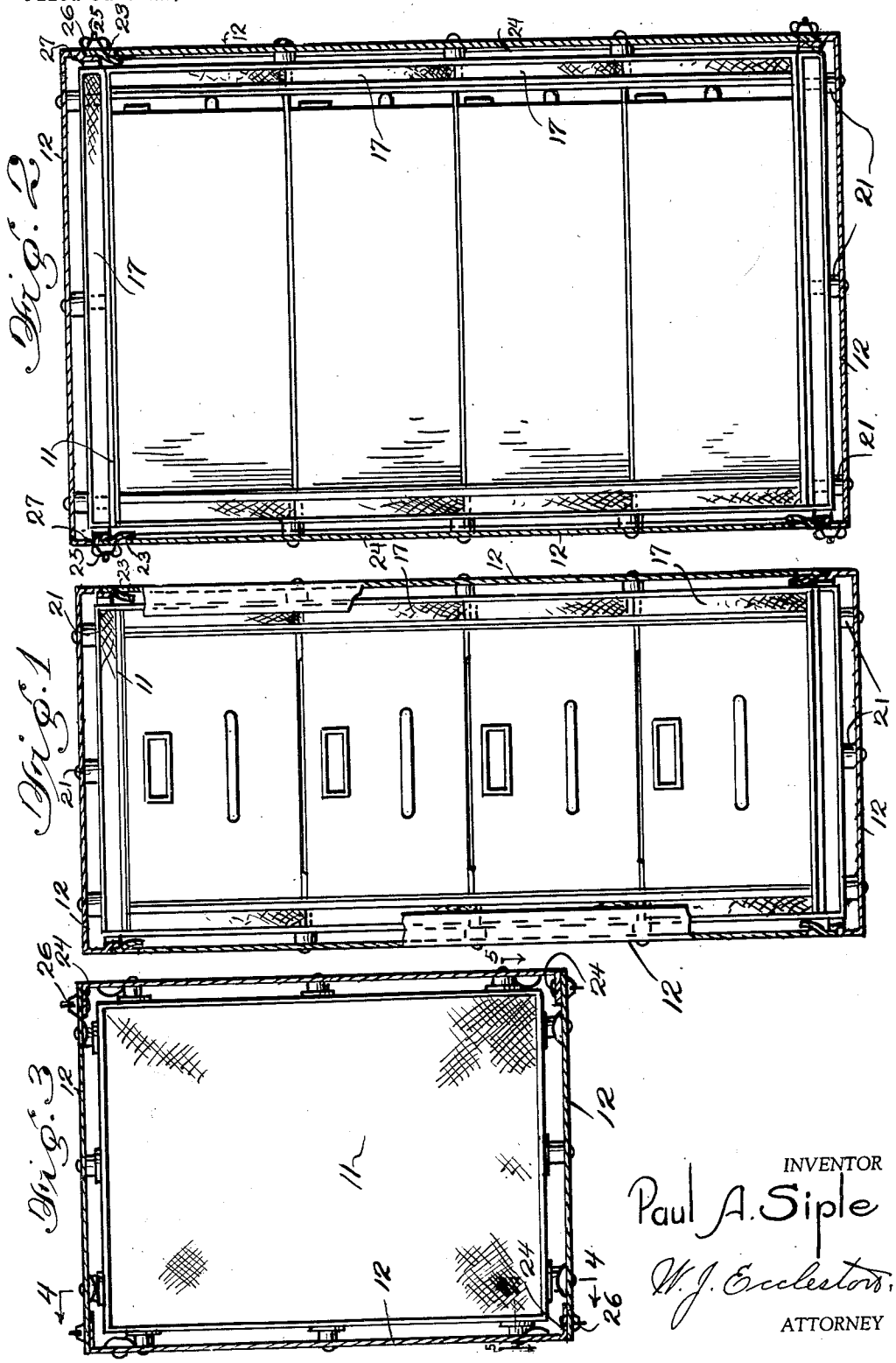


Fig. 2

Fig. 1

Fig. 3

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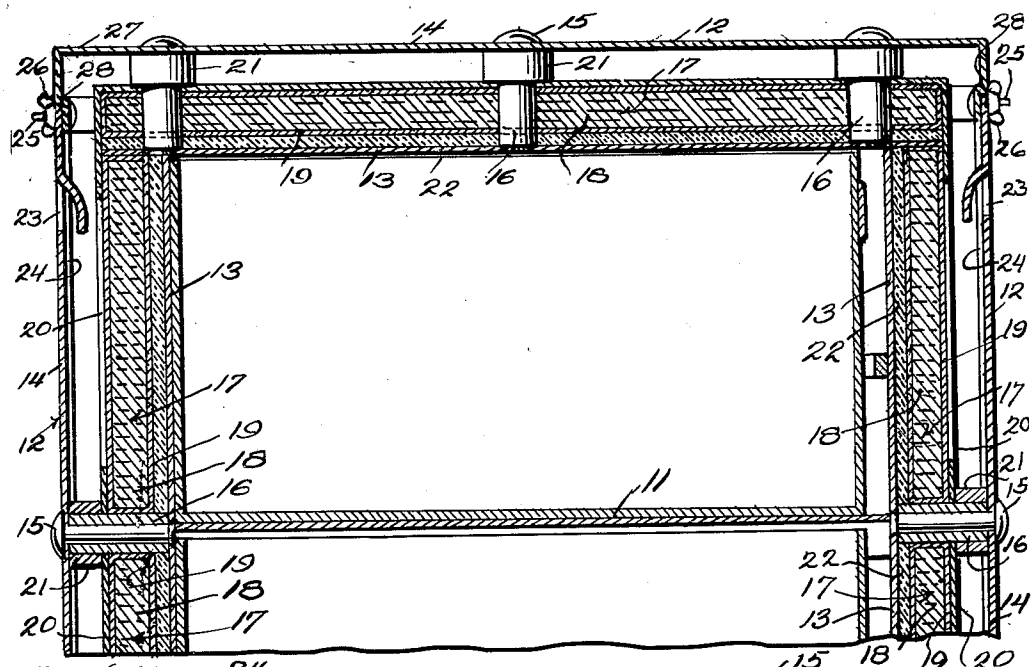


Fig. 4

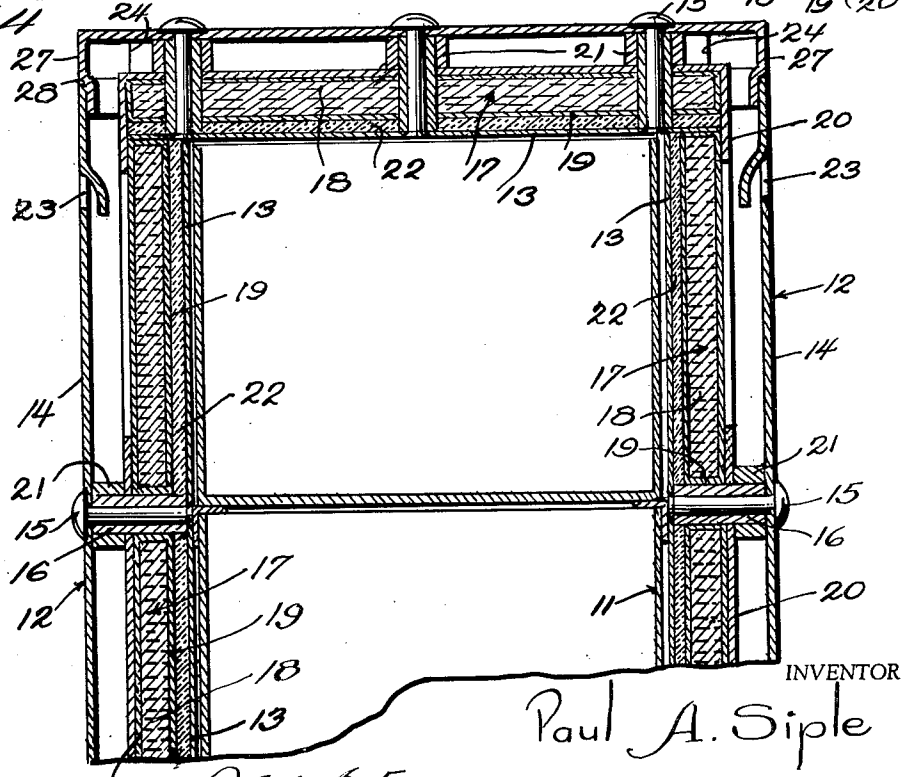


Fig. 5

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2,586,873

HEAT INSULATING RECEPTACLE

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Original application May 22, 1945, Serial No. 595,229, now Patent No. 2,520,972, dated September 5, 1950. Divided and this application June 22, 1950, Serial No. 169,765

5 Claims. (Cl. 109—29)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein, if patented may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This application is a division of my copending application Serial No. 595,229, filed May 22, 1945, now Patent No. 2,520,972, dated September 5, 1950.

My invention relates to heat insulating receptacles, and more particularly to a receptacle for enclosing objects to protect them from flames and intense heat so constructed that it may be permanently or removably secured about the body and including means sealed within its walls for dissipating the heat therefrom under conditions of abnormal temperature.

In the past various means have been devised for protecting safes, file cabinets, mail pouches and other receptacles for containing or storing valuables of all kinds against heat and flames. In all of these covers the protection afforded is secured by thermally insulating the inner storage space from exterior heat, and various constructions have been devised for this purpose. The walls of the protective covers may be made from material of low heat conductivity, or a thermal insulating material may be disposed intermediate the inner and outer walls of the protective container, or a dead air space or spaces may be provided in these walls or various combinations of these constructions may be used. Such covers and containers are effective only to the extent that these specially constructed walls prevent conduction of heat inwardly, and in this respect they are often inadequate. Although flames may be prevented from reaching the interior compartments, nevertheless, so much heat is conducted through the walls that the objects or materials stored therein are scorched or damaged in other respects by the heat. The only means of preventing this is by increasing the thickness of the walls of the containers, but consideration of factors such as the space available or limits on permissible loads may limit the thickness of the walls. For example, pouches for carrying registered mail, air mail or valuable cargoes by train, ship or air express must not only be sturdy and compact but also light in weight so that the largest possible pay load can be carried on each trip. There is a practical limit to the permissible wall thickness in such containers or pouches which, if exceeded, destroys the usefulness of the container. The protective covers described and claimed in this application are particularly suitable, but not limited to use in such

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applications. As the description proceeds, it will be obvious that they are equally adaptable and effective for use in protecting stationary storage receptacles such as file cabinets, safes and storage boxes of all kinds. By making use of my invention it is possible to construct a heat insulating protective cover with relatively thin walls because I provide a vaporizable coolant sealed in the walls of the cover or container and releasable after a predetermined temperature is reached, for absorbing heat from the walls of the cover and dissipating it to the surroundings to prevent its transfer inwardly to the interior of the container. Thus, it is possible to provide ample protection with a relatively thin walled cover. It has been found that covers constructed in accordance with my invention are particularly suitable for use in protecting valuable cargoes carried by airplanes because in the event the plane crashes and burns the fire, ordinarily, is of relative short duration, but the heat generated is very intense. Sufficient coolant can be carried within the walls of my protective cover to prevent the transfer of heat therethrough for the duration of the fire. It is, therefore, an object of my invention to provide a new and improved heat insulating cover in which a coolant is provided in the walls of the cover for absorbing heat conducted into the walls and dissipating it to the surroundings after a predetermined temperature is exceeded.

Another object of the invention is the provision of a new and improved protective cover for normally stationary cabinets, safes and other receptacles for valuables which may be constructed in sections and dismountably secured about the receptacle to be protected to provide all around protection therefor.

Another object of the invention is the provision of the new and improved heat insulating cover which has a readily vaporizable substance having a high heat of vaporization non-escapably sealed within its walls at normal temperatures, but which is vaporized by abnormal external heat and as a vapor discharges outwardly from the walls carrying with it the absorbed heat of vaporization which is thereupon dissipated to the surroundings.

Another object of the invention is the provision of a new and improved heat insulating cover having laminated walls, including laminations which non-escapably retain a coolant therein at normal temperatures, but which upon heating of the walls above a predetermined temperature

permits the escape of the coolant in vaporized form.

Another object of the invention is the provision of a new and improved heat insulating cover having outer wear resistant walls and having inner walls for non-escapably retaining a coolant between the outer walls at normal temperatures, the exteriorally facing walls being weakened by abnormal external heat so that rupturing of these walls by the vaporized coolant is promoted and the vapor discharges through the outer walls thereby dissipating the absorbed heat of vaporization.

Another object of the invention is the provision of a new and improved heat insulating cover which is light in weight, durable and compact in construction, inexpensive to manufacture and which may be used in covering objects of various sizes and shapes.

These and other objects of the invention will become apparent from the following description and accompanying drawings in which,

Figure 1 is a front elevational view of my improved cover secured on a file cabinet with the front panel removed to more clearly illustrate the construction and the manner in which my cover is mounted.

Figure 2 is a side elevational view of the protective cover shown in Figure 1 with a side panel removed.

Figure 3 is a top plan view partly in section, of the protective cover shown in Figure 1 with the top panel removed.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 3.

Referring to the drawings, in which similar characters of reference indicate similar parts throughout the several views, I have shown by way of illustration in Figures 1 to 5 a heat insulating cover for a file cabinet incorporating the principle of my invention. The file cabinet 11 is of standard construction and is surrounded by panels 12 which when assembled for a casing or housing completely enclose the cabinet. Each of these panels has inner and outer walls 13 and 14, respectively, of flat sheet metal of suitable thickness to provide a rigid self-supporting wall. The walls 13 and 14 are secured together in spaced relation by means of bolts or rivets 15 which carry a spacing sleeve 16 positioned thereon between the two walls for maintaining the walls in fixed spaced relation as shown in Figures 4 and 5. A plurality of thermal insulating pads 17 are secured in the space between panel walls 13 and 14, four pads of similar construction being shown in the side and end panels. Each of these pads consists of an inner layer of absorbent material 18 completely enclosed or jacketed by a layer of liquid and vapor impermeable material 19. The absorbent layer 18 is saturated with water before the impermeable jacket 19 is sealed about the pad so that each pad forms a unitary water jacket. The pads 17 are of such size that when placed in juxtaposed relation in the panel they completely overlie the inner wall thereof. Any material having high water absorbent properties such as Fiberglas cloth or wool may be used for the absorbent layer 18, and the impermeable jacket is made from a material impermeable to both liquid and vapor at normal temperatures, such as rubber or Vinylite latex or any of the synthetic rubbers or plastics which are impermeable to both liquid and vapor.

The bolts or rivets 15 are so spaced in the walls of the panel that they pass between adjacent pad 17 as shown in Figures 4 and 5, and the pads are held in place by a plurality of metal straps 20 extending from top to bottom of the panel. These straps have apertures through which the bolts 15 and sleeves 16 pass, and they are held in snug engagement with the outer face of the pads by means of spacing sleeves or blocks 21 secured on the bolts 15 over the spacing sleeves 16. These blocks 21 bear against the inner side of the outer wall 14 of the panel and the outer surface of the strap 20 as most clearly shown in Figures 4 and 5.

If desired a pad or layer of thermal insulating material 22 may be placed between the pads 17 and the inner wall 13 of the panel 12 to prevent the transfer of heat from the pads 17 to the inner wall of the panel or to the walls of the cabinet, but this insulating layer is not absolutely essential in all cases because the temperature of the inner side of the pads 17 will rarely exceed the boiling point of water, and, except in unusual cases, this degree of temperature will not damage the contents of a file cabinet.

A plurality of vents 23 are provided in the outer walls 14 of each of the panels 12 to permit the escape of vapor from the interior of the panels. A vertically extending flange 24 is formed on each of the vertically extending edges of the outer walls 14 of the side panels of the cover by folding these edges inwardly through an angle of 90°. These flanges are secured to the outer edges of the outer walls 14 of the front and rear panels which extend beyond the edges of the inner walls of these panels to engage these flanges on the side panels. A plurality of bolts 25 are permanently secured in the flanges and engage in apertures adjacent the edges of the outer wall of the front and rear panels of the covering as shown in Figures 2 and 4. Wing nuts 26 are threaded on the outer ends of these bolts and, when tightened, secure the front and back panels to the side panels to form a housing having an open top and bottom.

The top and bottom panels of the covering are of similar construction to the side panels but the outer edges of the outer walls 14 of these panels are folded downwardly to form sides and ends 27 for these panels, and the free edges of these sides and ends are off-set inwardly as indicated at 28 in Figures 4 and 5 so that these edges of the top and bottom panels are receivable in the open top and bottom of the covering and snugly engage the edges of the outer walls 14 of the front, and side panels 12. If desired, the off-set edges of the top and bottom panels and the adjacent edges of the vertically extending panels may be apertured for the reception of belts for permanently securing the top and bottom panels to the vertically extending front, rear and side panels.

It will be apparent from this description that the panel construction which I have described provides a protective covering which may be quickly and easily installed about a cabinet or other storage receptacle or dismounted therefrom as desired, and when it becomes necessary to gain access to the interior, the front panel can be quickly removed. The construction described also permits ready dismantling of the separate panels so that the pads 17 may be replaced if that becomes desirable or necessary.

When the protective covering described above is subjected to abnormal heat the water in the

pads 17 is vaporized and as the pressure in the pads increases the vapor ruptures the impermeable walls 19 of the pad and escapes to the space in the interior of the panel and from this space to the exterior through the vents 23 in the walls 14 of the panels. Escaping vapor carries with it the latent heat of vaporization absorbed by it in being vaporized and dissipates it to the surroundings. In this manner, heat is carried from the walls of the cover and is prevented from being conducted inwardly through those walls, and, as a result, the interior compartment of the cover is maintained at a relatively low temperature.

The walls of the pads 17 may be provided with vents which have stoppers adapted to be blown out by the vapor in the pad when its pressure exceeds a predetermined amount. Vents of this type may also be used if desired when the pads are provided with flexible impermeable walls, but rupturing of the impermeable walls will be facilitated by the action of heat because the heat tends to cause deterioration of these walls so that they are more easily ruptured. The absorbent layers 18 hold the liquid water after the impermeable walls are ruptured so that it does not leak from the pad.

For certain types of depositories for valuables such as safes or even in file cabinets a thermal insulating means constructed as above described may be built into the walls of the depository or cabinet. If this type of construction is applied to a safe the thermal insulating pads 17 are positioned in the walls of the safe under the outer armor plating of all of the walls including the door, and vents 23 are provided in those walls to permit escape of vapor. When the thermal insulating pads are built into a file cabinet an outer metallic shell is provided and the pads are secured in the space between the cabinet wall and the shell. A layer of thermal insulating material, similar to the layer 22, is preferably positioned between the walls of the cabinet and the pads of the drawers are provided with double front walls within which is inserted a heat insulating pad 17 and a thermal insulating layer.

When receptacles in accordance with the present invention are to be used where the temperature drops below the freezing point of water it may be advisable to include an anti-freeze in the water to prevent its freezing. Various other modifications may be made in the invention to provide a heat insulating cover for particular objects or for use in special locations or for special purposes. The various specific structures described herein are illustrative only and are not intended to restrict the invention to any of the particular forms described except as limited by the claims included herein.

What I claim as new and desire to secure by Letters Patent is as follows:

1. A heat insulating protective receptacle comprising a plurality of rigid inner and outer walls disposed to form a confined space therebetween, a flexible absorbent material contained in the space within said inner and outer walls for holding a liquid coolant having a high heat of vaporization and vaporizable when abnormal external heat is conducted into the space between said walls, said outer wall being adapted to permit discharge of vapor therethrough, said vapor dissipating the absorbed heat of vaporization to the surroundings when escaping and thereby maintaining the interior of said receptacle in a cool condition, and liquid- and vapor-impermeable flexible laminations intermediate said absorbent material and said walls enclosing and non-escapably sealing said coolant in said absorbent material at normal temperatures, at least one of said laminations being rupturable under conditions of external heat and internal vapor pressure, and means for bracing said flexible absorbent material and said flexible laminations and maintaining them in a position surrounding the contents of said receptacle.

2. A heat insulating protective receptacle comprising a plurality of panels, each of said panels comprising a first rigid wall and a second rigid wall disposed to form a confined space therebetween, said first wall facing outside when said panels are assembled, a flexible absorbent material contained in the space within said walls for holding a liquid coolant having a high heat of vaporization and vaporizable when abnormal external heat is conducted into the space between said walls, said first rigid wall being adapted to permit discharge of vapor, said vapor dissipating the absorbed heat of vaporization to the surroundings when escaping and thereby maintaining the interior of said receptacle in a cool condition, and liquid- and vapor-impermeable flexible laminations intermediate said absorbent material and said walls enclosing and non-escapably sealing said coolant in said absorbent material at normal temperatures, at least one of said laminations being rupturable under conditions of external heat and internal vapor pressure, and means for bracing said flexible absorbent material and said flexible laminations and maintaining them in a position surrounding the contents of said receptacle; said panels being dismountably secured in edge abutting relation.

3. A heat insulating protective panel comprising a pair of spaced rigid walls, one of said walls being apertured to permit discharge of vapor therethrough, a plurality of flexible pads retained in the space between said walls, the aggregate area of said pads being substantially coextensive with the area of said panel, each of said pads comprising flexible absorbent material for holding a liquid coolant having a high heat of vaporization and vaporizable when abnormal external heat is conducted into the space between said walls, and a liquid- and vapor-impermeable flexible envelope enclosing said absorbent material for non-escapably sealing said coolant in said absorbent material at normal temperatures, said envelope being rupturable under conditions of external heat and internal vapor pressure whereby vaporized coolant escapes through said apertured wall and dissipates the absorbed heat of vaporization to the outside, and means for bracing said flexible pads and maintaining them in a position parallel to said rigid walls.

4. A heat insulating protective panel comprising a pair of spaced rigid walls, one of said walls being apertured to permit discharge of vapor therethrough, a plurality of flexible pads retained in the space between said walls, the aggregate area of said pads being substantially coextensive with the area of said panel, each of said pads comprising flexible absorbent material for holding a liquid coolant having a high heat of vaporization and vaporizable when abnormal external heat is conducted into the space between said walls, and a liquid- and vapor-impermeable flexible envelope enclosing said absorbent material for non-escapably sealing said coolant in said absorbent material at normal temperatures, said envelope being rupturable under conditions of external heat and internal vapor pressure whereby vapor-

ized coolant escapes through said apertured wall and dissipates the absorbed heat of vaporization to the outside, and means for bracing said flexible pads and maintaining them in a position spaced from said apertured wall.

5. A heat insulating protective knock-down receptacle comprising a plurality of panels according to claim 3, at least one of said panels having flanges interfitting with the adjacent panels and means for removably securing said flanges to said last-named panels, whereby when said panels are assembled, the contents of said

receptacle are surrounded by said pads in substantially contiguous relationship.

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REFERENCES CITED

The following references are of record in the file of this patent:

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