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(54) HEAT SEALING ELEMENT AND CONTROL OF SAME

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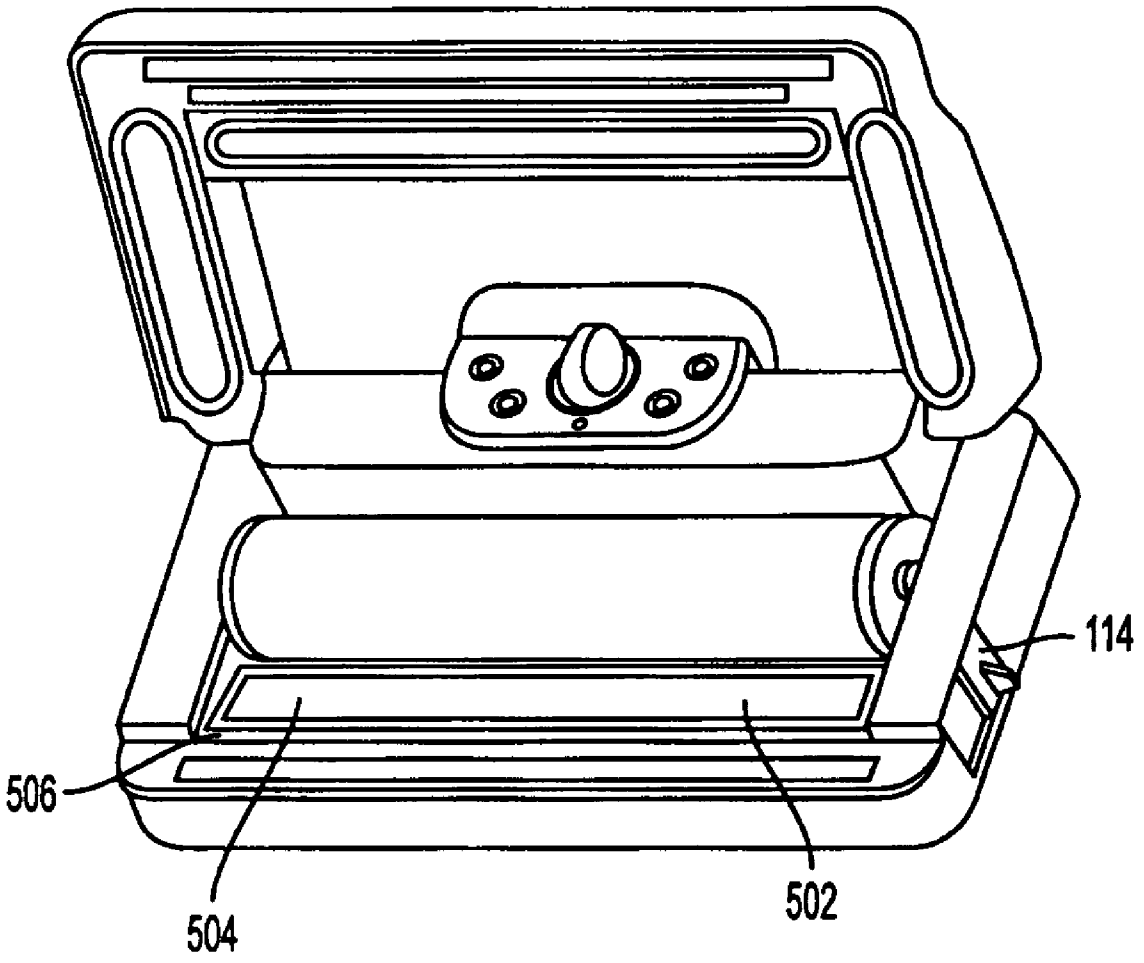
(52) **U.S. Cl.** **53/434**; 53/512

(57) **ABSTRACT**

A vacuum packaging appliance for heat sealing items in a vacuum packaging plastic bag is disclosed. The appliance comprises a lid adapted to define a vacuum chamber when it is moved to a closed position relative to a trough in the base of the device. Adjacent to a trough in the lower portion of the device, a heat sealing element is placed in order to seal the contents of the bag once the vacuum packaging is complete. In another embodiment, the heat sealing element is mounted on the lid of the device and comes into contact with the vacuum bag when the lid is in a closed position. The heat sealing elements are controlled by a controller that allows operator selections of seals and sealing time adjustments based on inputs from a plurality of sensors. The controller is further able to energize one or two of the heating elements based on predetermined conditions. The methods and structures described control both heating and cooling of the heat sealing elements. The vacuum pump exhaust may also be directed below the heat sealing elements in order to cool the elements. The control and placement of the heat sealing elements allows for precise feedback and temperature control of the elements and therefore ensuring proper vacuum sealing of the containers.



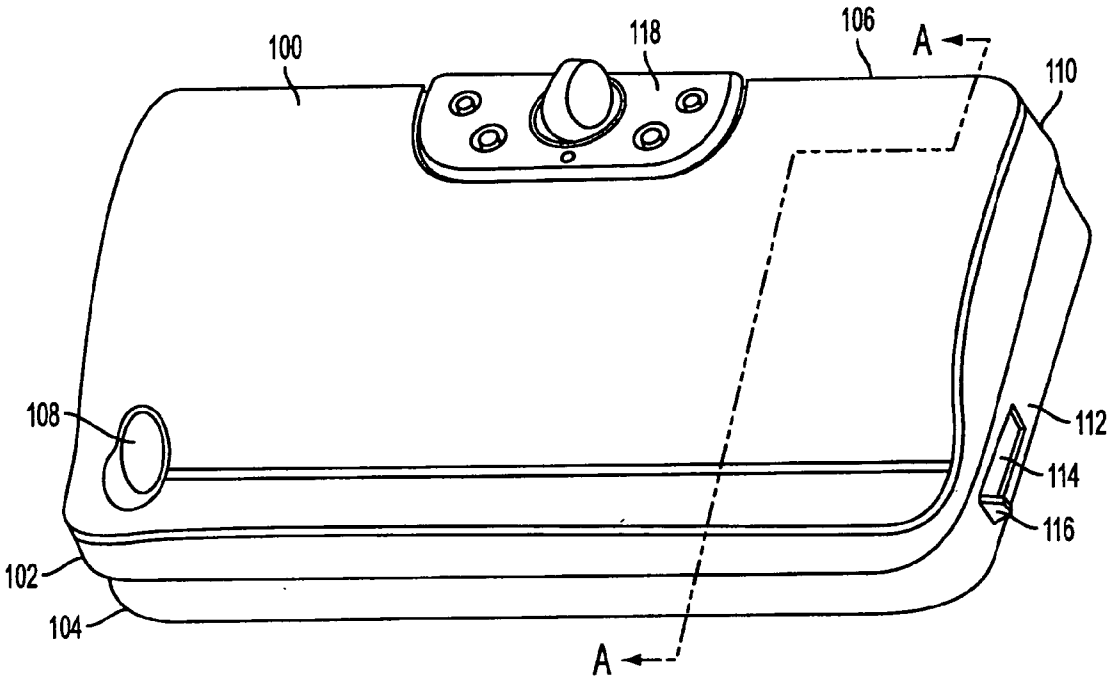


FIG. 1

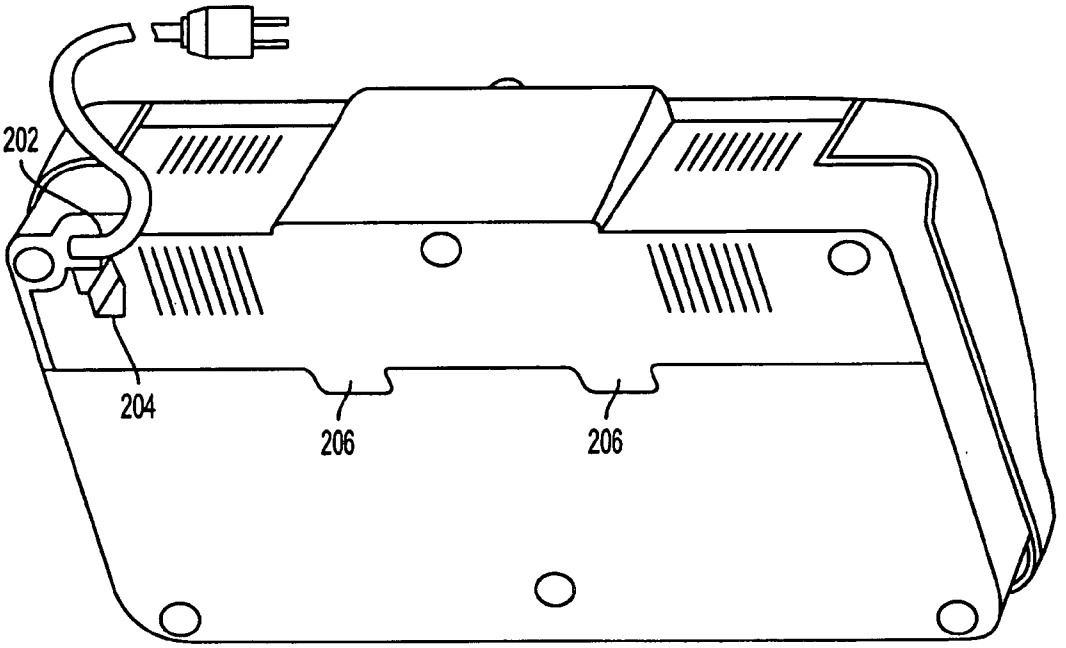


FIG. 2

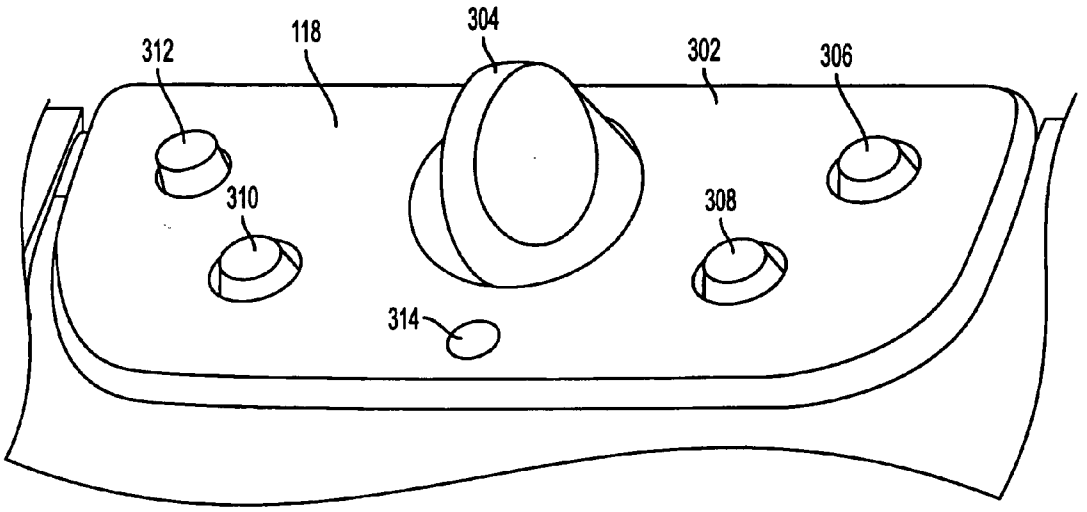


FIG. 3

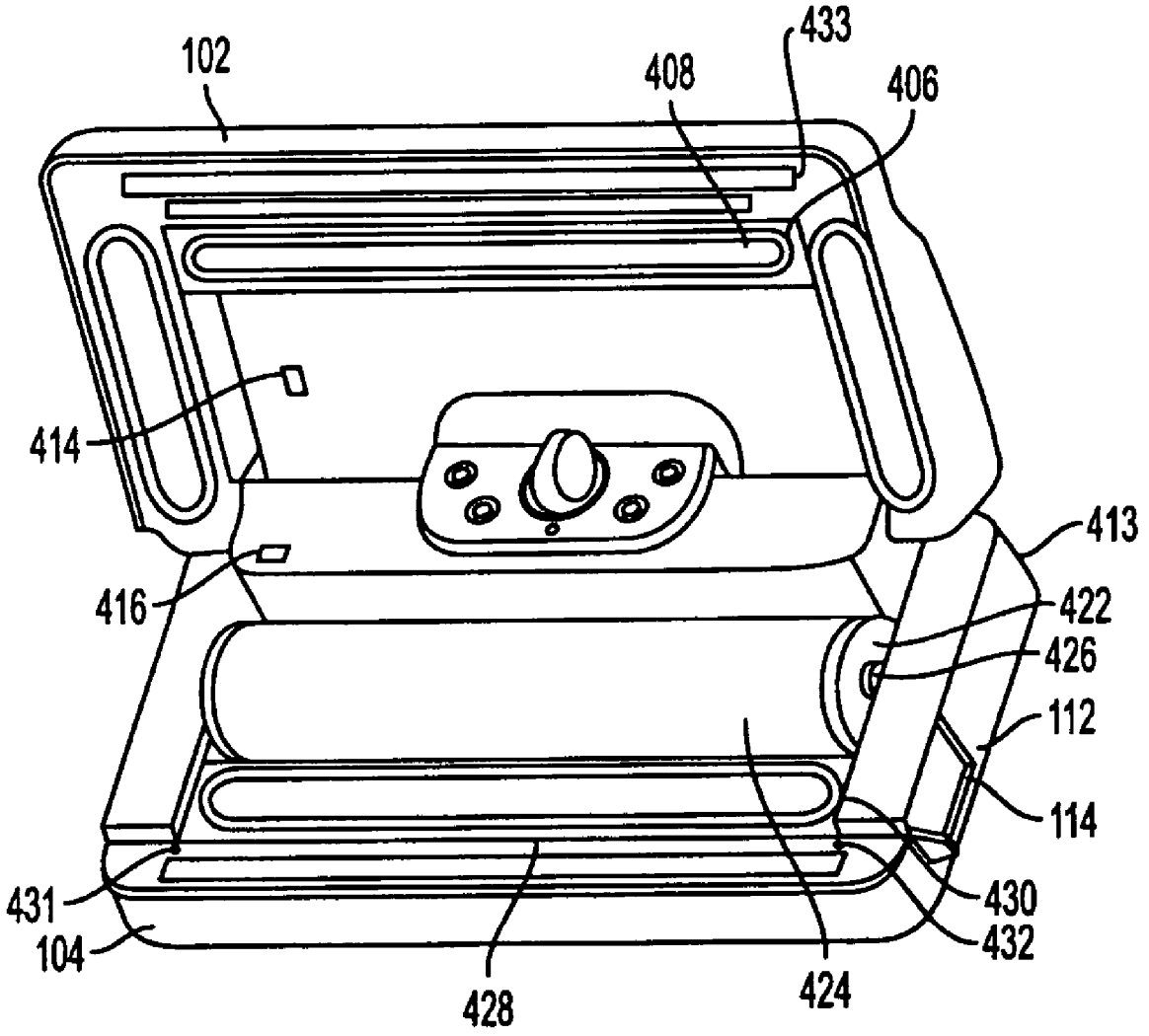

102
408
433
406
414
413
416
422
426
112
114
431
430
104
432
428
424

FIG. 4

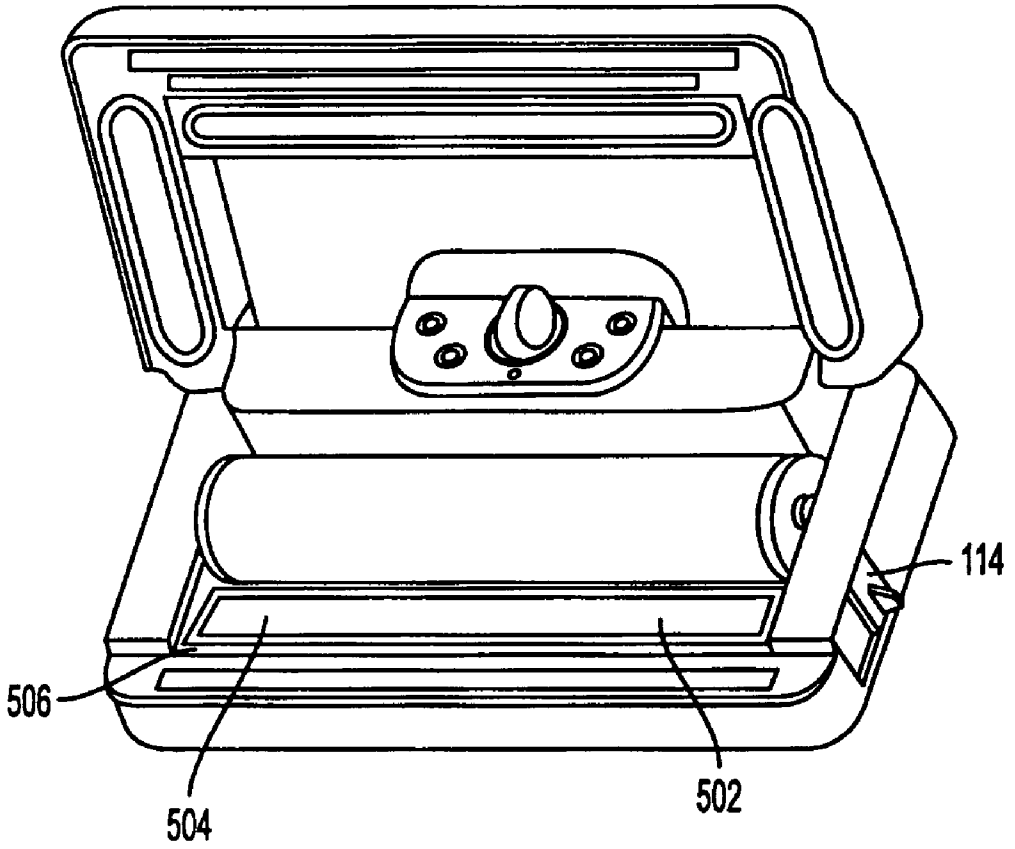


FIG. 5

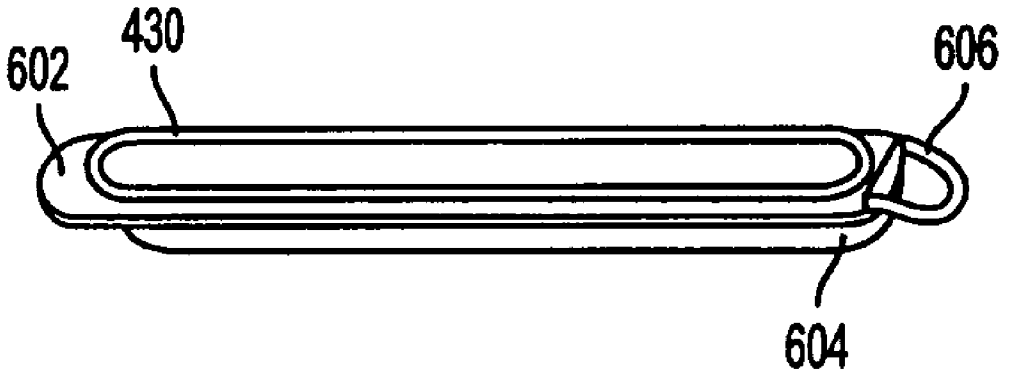


FIG. 6

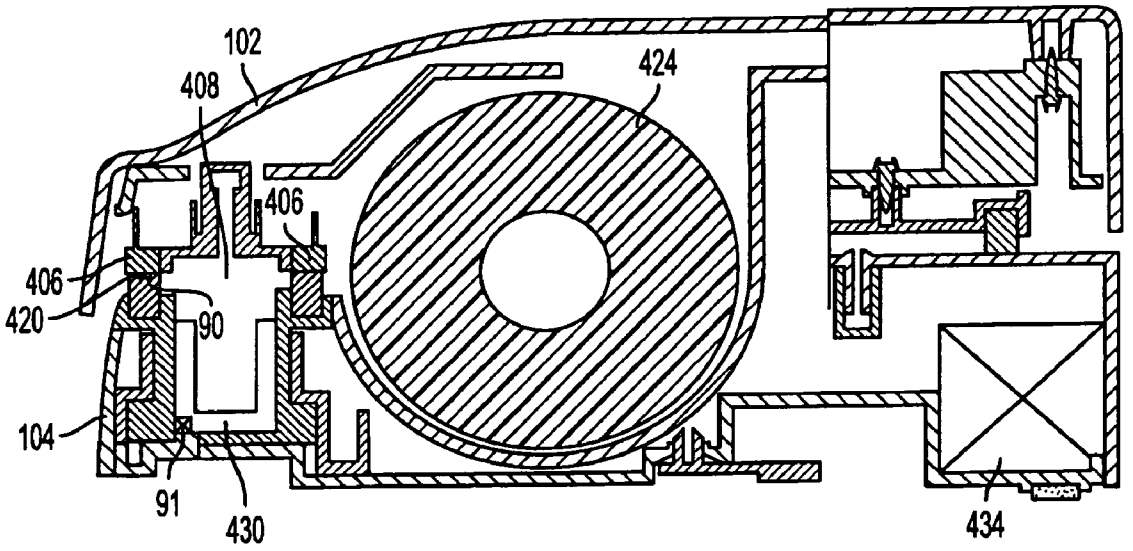


FIG. 7

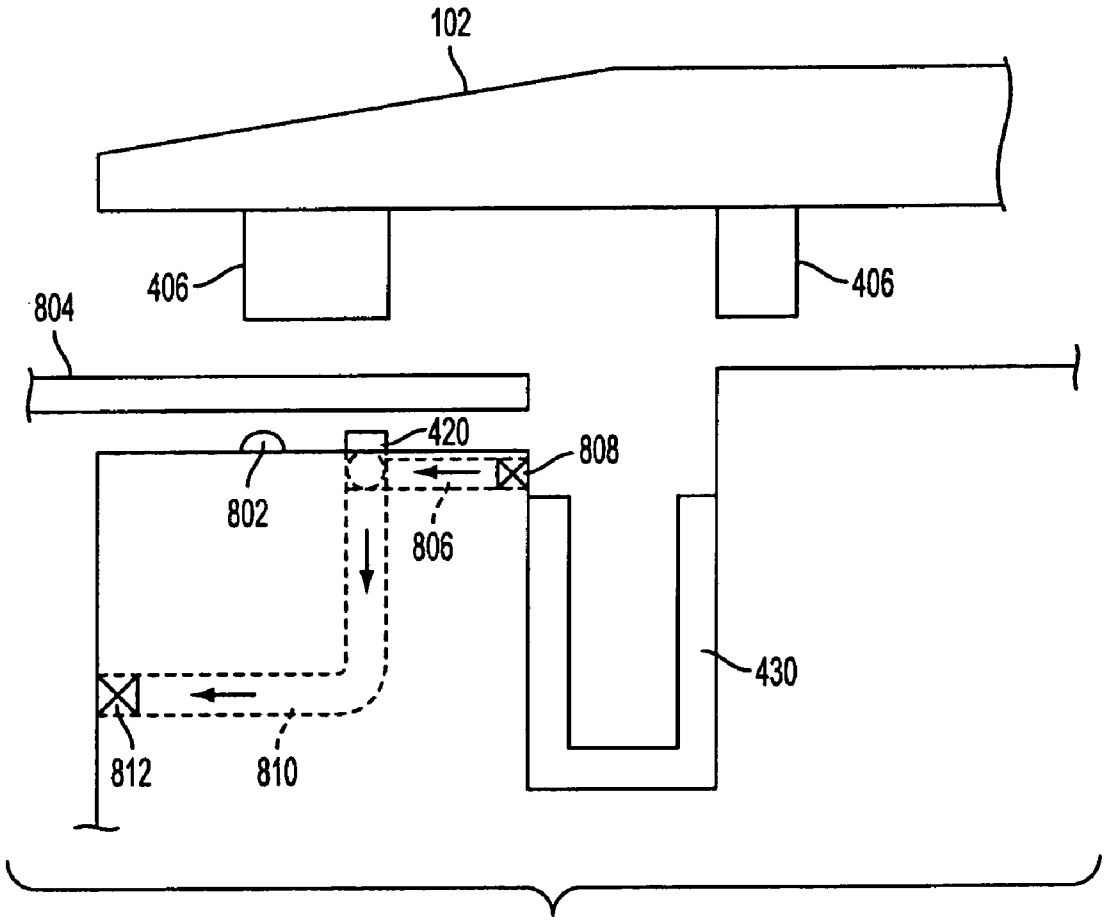


FIG. 8

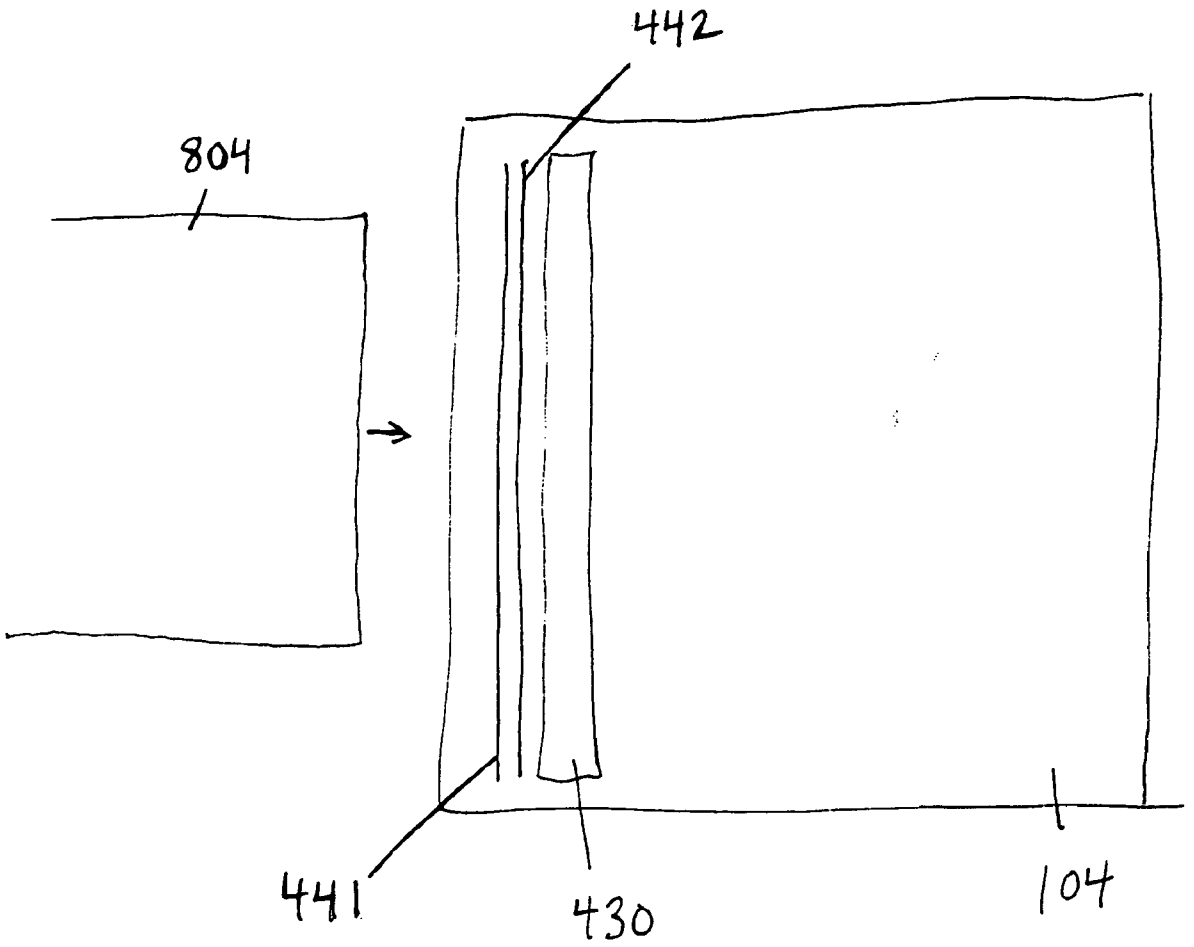


FIG. 8A

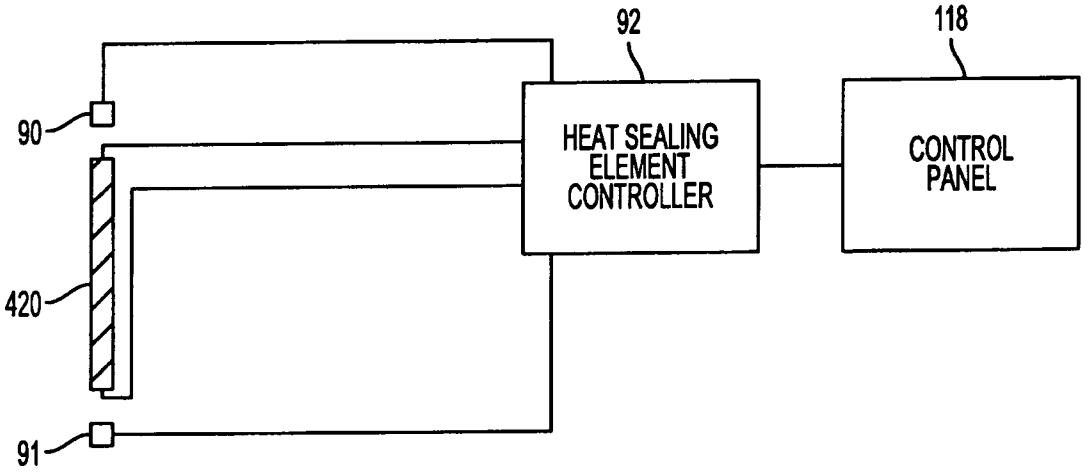

92
118
90
HEAT SEALING ELEMENT CONTROLLER
CONTROL PANEL
420
91

FIG. 9

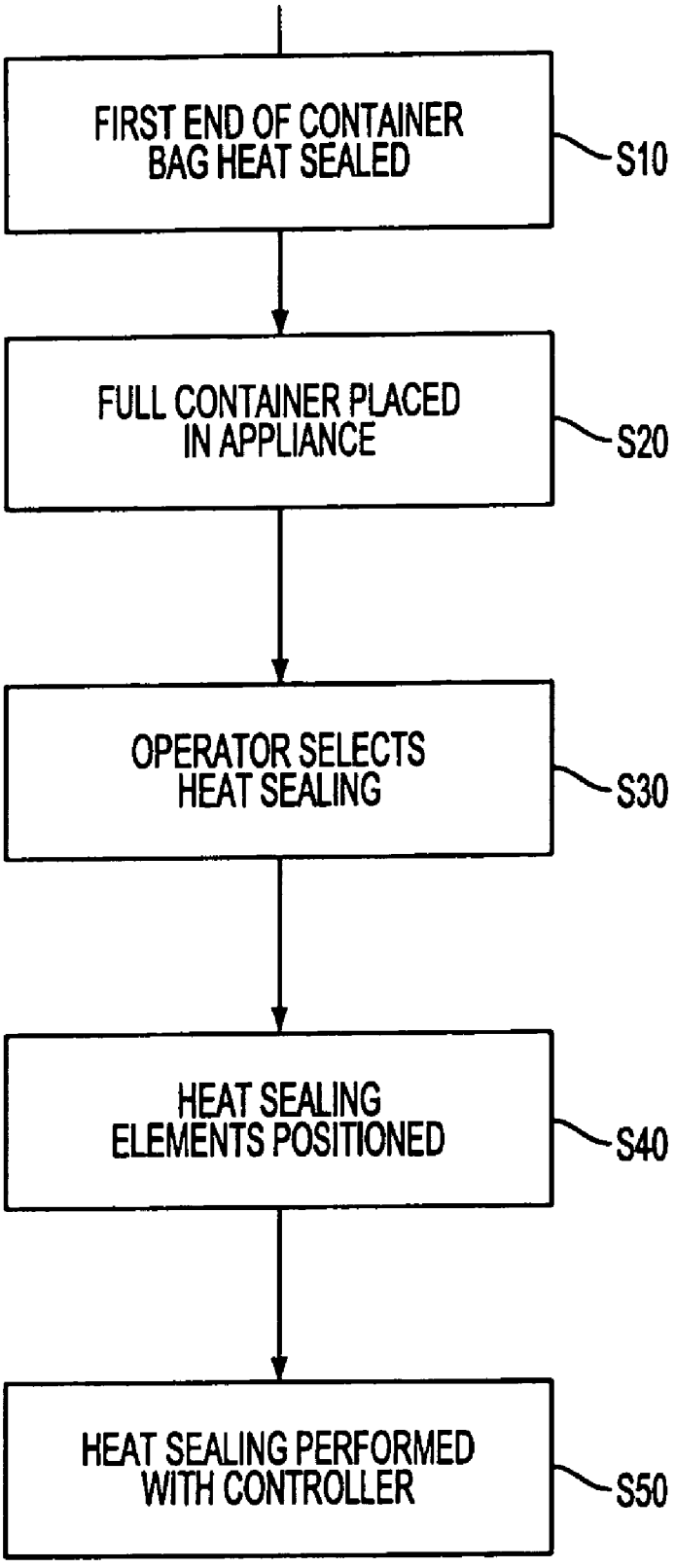

FIRST END OF CONTAINER BAG HEAT SEALED
S10
FULL CONTAINER PLACED IN APPLIANCE
S20
OPERATOR SELECTS HEAT SEALING
S30
HEAT SEALING ELEMENTS POSITIONED
S40
HEAT SEALING PERFORMED WITH CONTROLLER
S50

FIG. 10

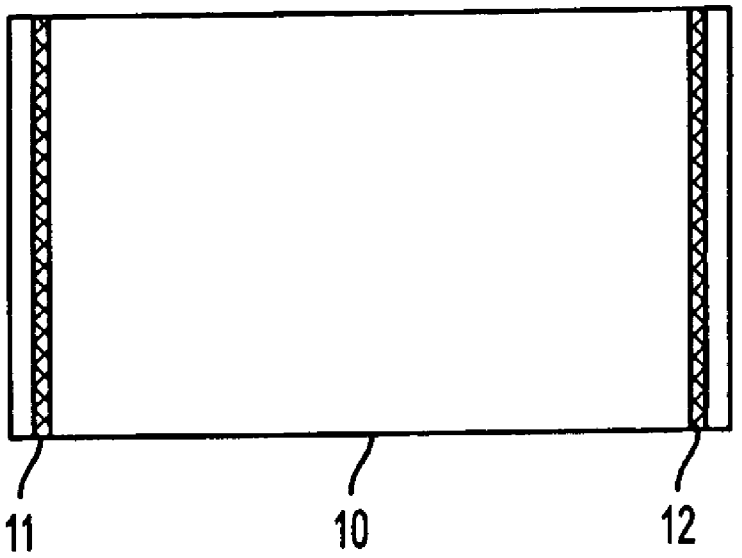


FIG. 11

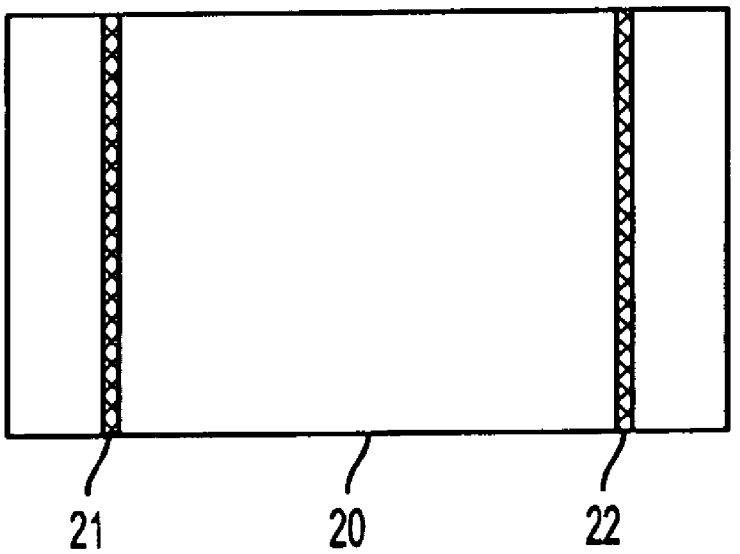


FIG. 12
(PRIOR ART)

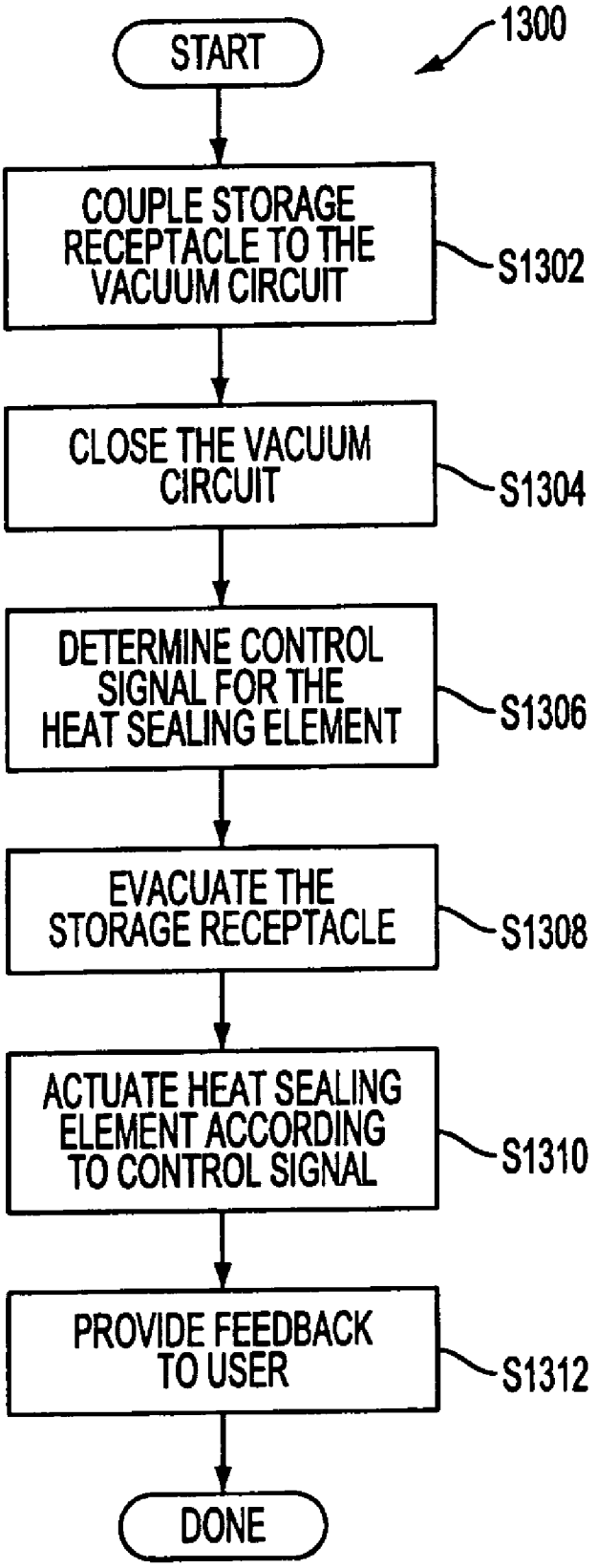

1300
START
COUPLE STORAGE RECEPTACLE TO THE VACUUM CIRCUIT
S1302
CLOSE THE VACUUM CIRCUIT
S1304
DETERMINE CONTROL SIGNAL FOR THE HEAT SEALING ELEMENT
S1306
EVACUATE THE STORAGE RECEPTACLE
S1308
ACTUATE HEAT SEALING ELEMENT ACCORDING TO CONTROL SIGNAL
S1310
PROVIDE FEEDBACK TO USER
S1312
DONE

FIG. 13

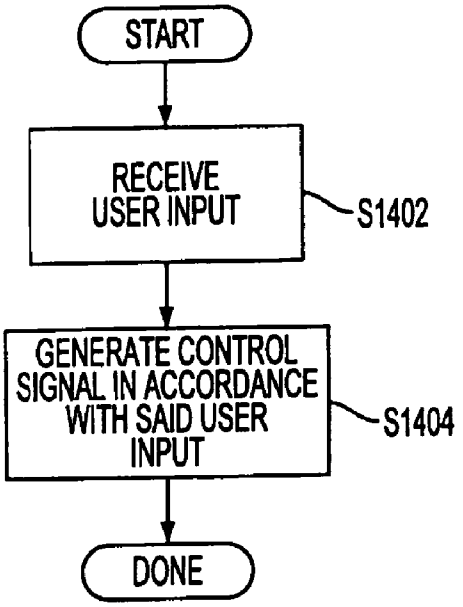

START
RECEIVE USER INPUT
S1402
GENERATE CONTROL SIGNAL IN ACCORDANCE WITH SAID USER INPUT
S1404
DONE

FIG. 14

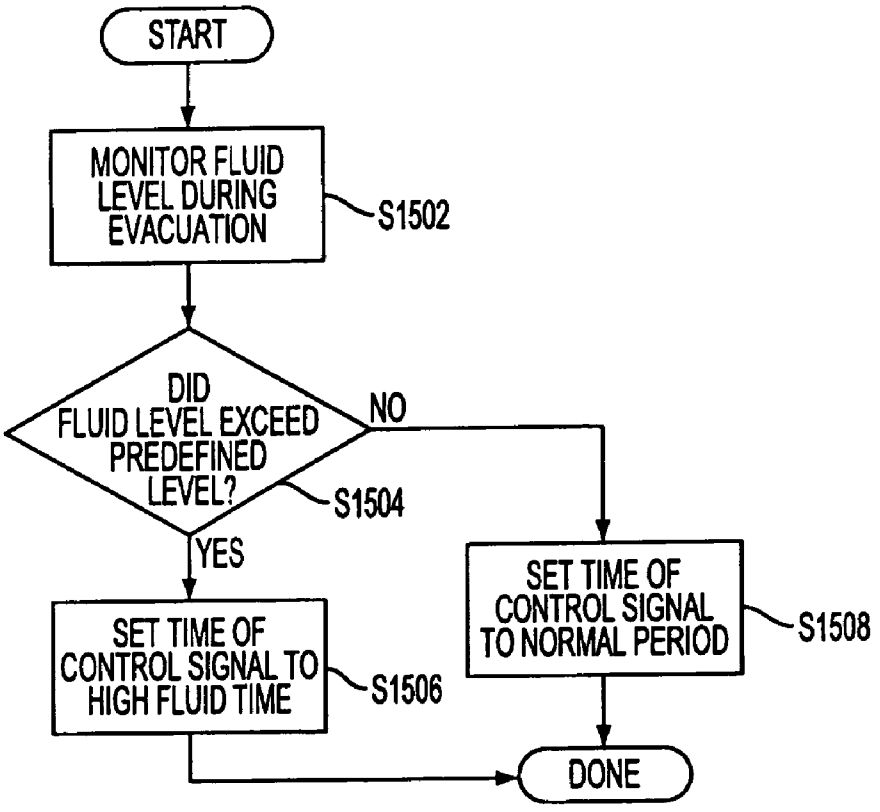

START
MONITOR FLUID LEVEL DURING EVACUATION
S1502
DID FLUID LEVEL EXCEED PREDEFINED LEVEL?
S1504
NO
YES
SET TIME OF CONTROL SIGNAL TO HIGH FLUID TIME
S1506
SET TIME OF CONTROL SIGNAL TO NORMAL PERIOD
S1508
DONE

FIG. 15

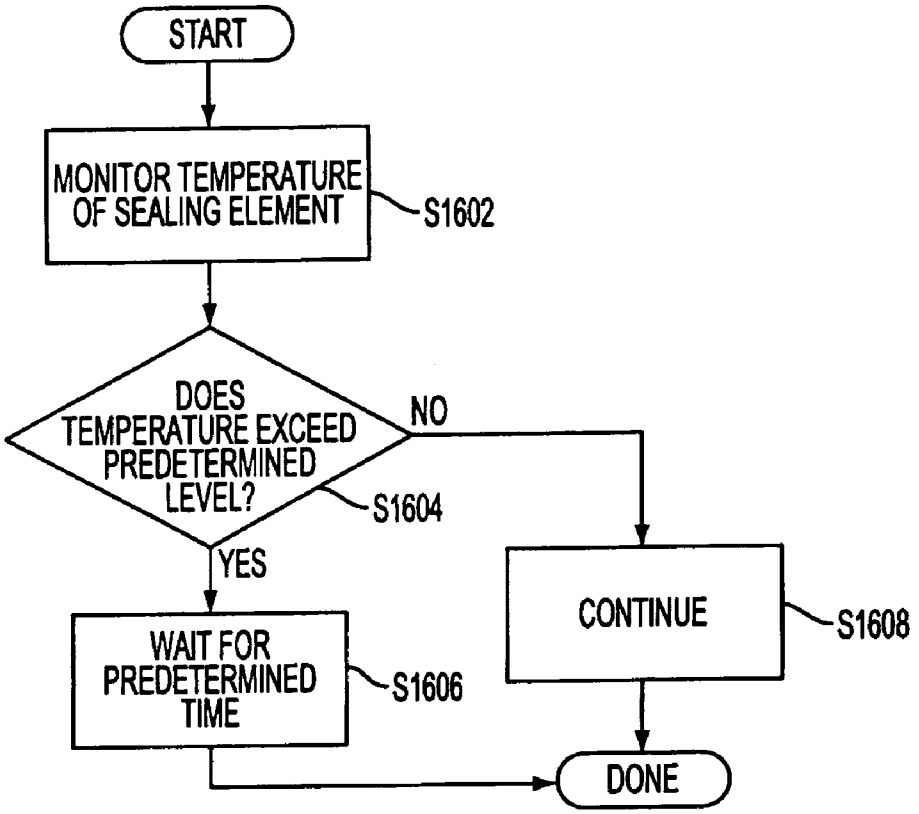

START
MONITOR TEMPERATURE OF SEALING ELEMENT
S1602
DOES TEMPERATURE EXCEED PREDETERMINED LEVEL?
S1604
NO
YES
WAIT FOR PREDETERMINED TIME
S1606
CONTINUE
S1608
DONE

FIG. 16

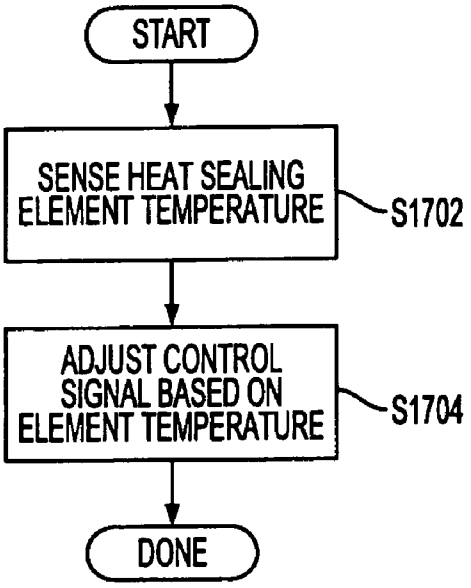

START
SENSE HEAT SEALING ELEMENT TEMPERATURE
S1702
ADJUST CONTROL SIGNAL BASED ON ELEMENT TEMPERATURE
S1704
DONE

FIG. 17

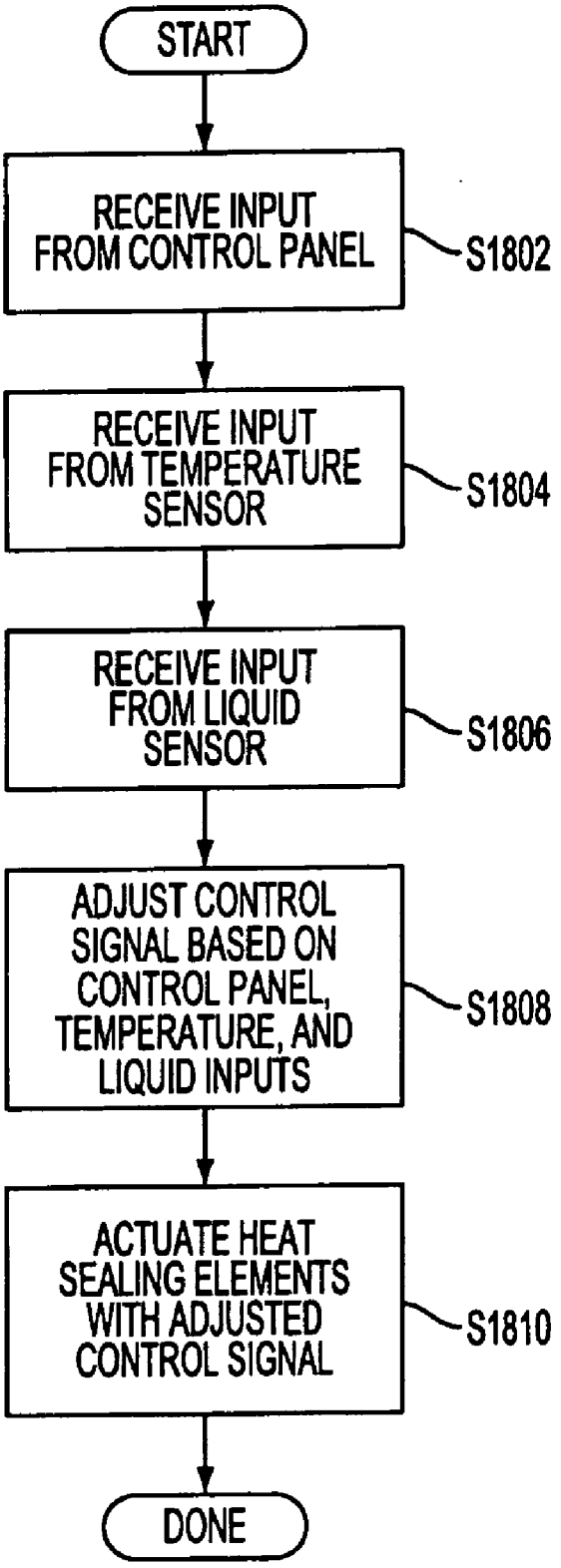

START
RECEIVE INPUT FROM CONTROL PANEL
S1802
RECEIVE INPUT FROM TEMPERATURE SENSOR
S1804
RECEIVE INPUT FROM LIQUID SENSOR
S1806
ADJUST CONTROL SIGNAL BASED ON CONTROL PANEL, TEMPERATURE, AND LIQUID INPUTS
S1808
ACTUATE HEAT SEALING ELEMENTS WITH ADJUSTED CONTROL SIGNAL
S1810
DONE

FIG. 18

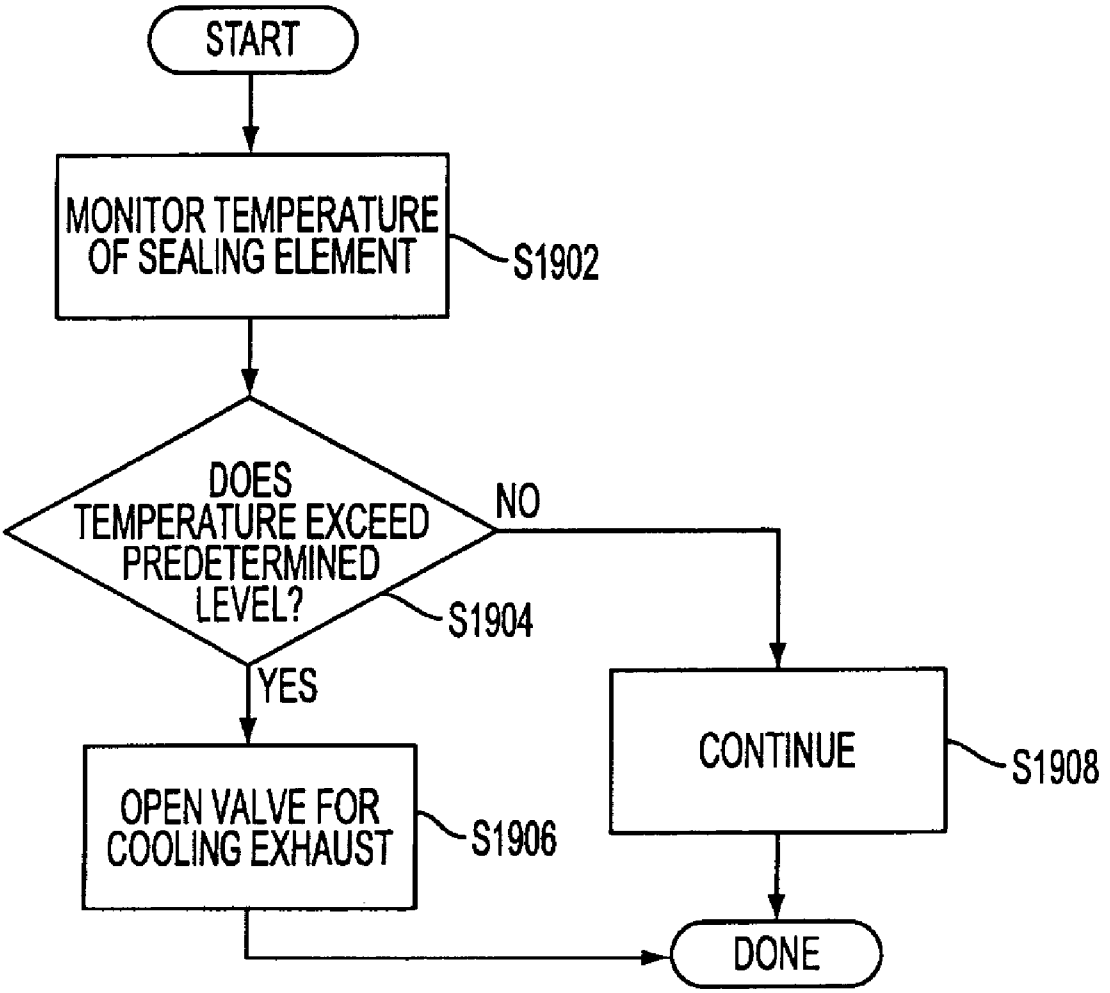

START
MONITOR TEMPERATURE OF SEALING ELEMENT
S1902
DOES TEMPERATURE EXCEED PREDETERMINED LEVEL?
S1904
NO
YES
OPEN VALVE FOR COOLING EXHAUST
S1906
CONTINUE
S1908
DONE

FIG. 19

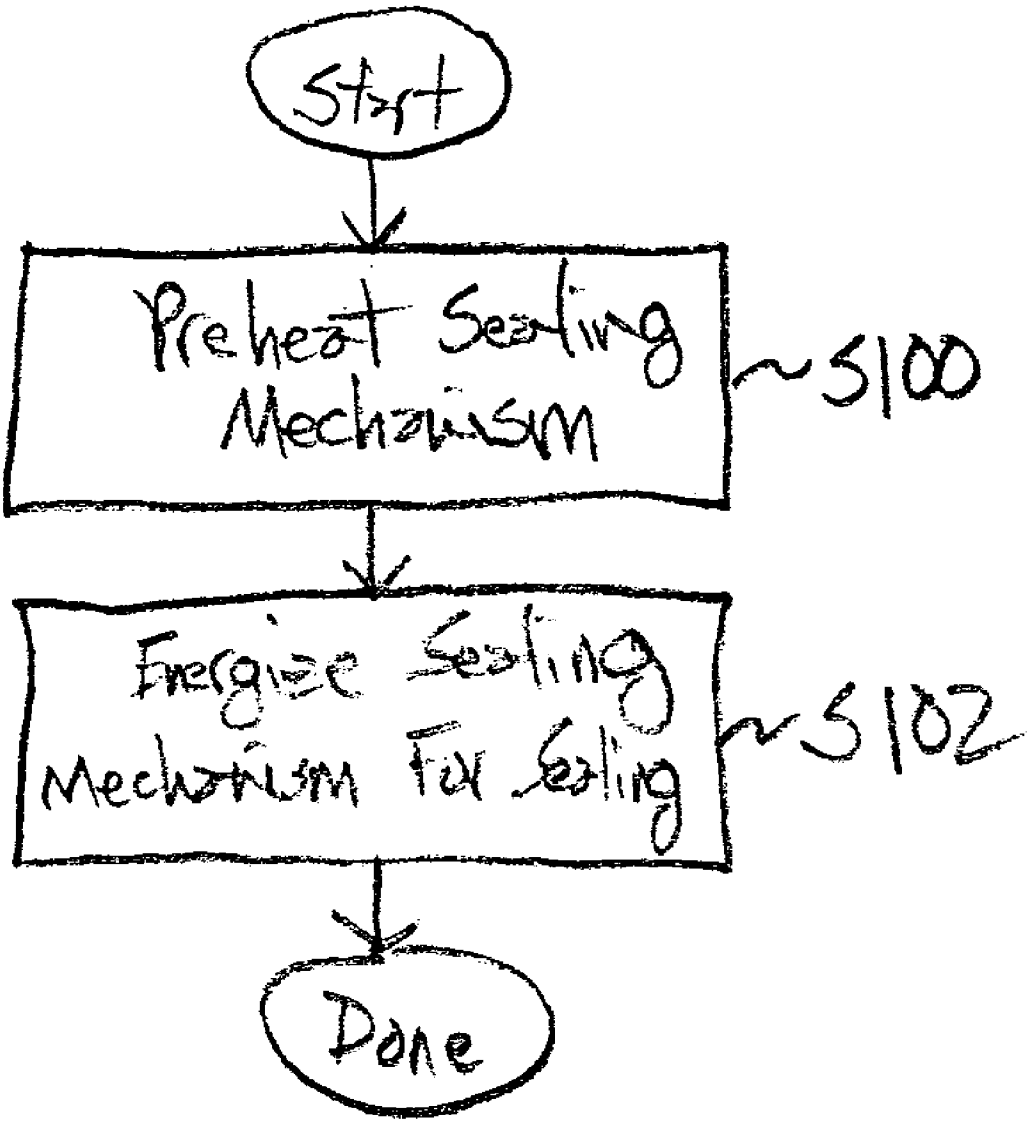

Start
Preheat Sealing Mechanism
5100
Energize Sealing Mechanism for Sealing
5102
Done

FIG. 20

HEAT SEALING ELEMENT AND CONTROL OF SAME

[0001] This application claims priority to Albritton et al.'s provisional patent application 60/491,876, filed Jul. 31, 2003, entitled HEAT SEALING ELEMENT AND CONTROL OF SAME, the contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The invention relates to a vacuum packaging appliance for packaging products and more particularly to heat sealing elements and a heat sealing controller used to seal an evacuated container once it has been processed by the vacuum packaging appliance.

BACKGROUND OF THE INVENTION

[0003] Presently, various appliances and methods are used for the purpose of vacuum sealing plastic bags and containers to protect perishables, such as foodstuffs, and other products against oxidation. Conventional commercial appliances and some consumer appliances are generally expensive to manufacture, complex in construction and/or cumbersome to operate. There are also different types of heat sealing mechanisms contained in these prior art devices that have limited success in hermetically sealing the evacuated bags.

[0004] One type of conventional vacuum sealing appliances uses a vacuum nozzle that is inserted within a plastic bag for evacuation purposes. Although adaptable for low-volume home use, this type of system is cumbersome to use and normally requires a liquid separator or filter to prevent liquids or powders, retained within the bag, from being drawn into a vacuum pump connected to the nozzle. Further, a heat sealer employed therein must be closely synchronized with the positioning and withdrawal of the vacuum nozzle from the bag. This greatly adds to the cost and complexity of the device itself

[0005] U.S. Pat. No. 3,928,938 discloses another type of vacuum sealing appliance that employs a heat sealing mechanism. In this appliance a user places a portion of a bag, containing a product to be packaged, in a first vacuum chamber and extends an open end or neck of the bag into a second vacuum chamber. The first vacuum chamber is then evacuated to expand the neck of the bag to isolate the chambers from each other. Then a vacuum is drawn in the second vacuum chamber to evacuate the bag. Thus, isolation of the two chambers from each other, during evacuation of the second vacuum chamber, is dependent on the physical properties composing the neck of the bag and very close synchronization and calibration of the evacuation and sealing procedures and controls therefor. This complex process in conjunction with the heat sealing mechanism is not reliable.

[0006] These prior art appliances described above and others require the use of special bags that must be purchased from the manufacturer. Due to the cost of the vacuum useable bags, it is desirable to conserve the material as much as possible. One problem with the above appliances is that there is a substantial amount of wasted vacuum bag material between the end of the bag and the heat seal as shown in Prior Art **FIG. 12**. **FIG. 12** shows a container **20**, with heat seals **21** and **22**. For example, the vacuum sealed container **20** of **FIG. 12** may be approximately 10 inches in length. The length between the end of the container **20** and each heat seal (**21** and **22**) is approximately an inch and a half. Therefore 3 inches of bag material is essentially unused for a 10 inch vacuum sealed bag. Therefore prior art devices waste approximately 30% of the vacuum bag material per use.

[0007] Another problem with prior art vacuum packaging appliances is that the temperature of the heat sealing mechanism is not accurately controlled. This is because the prior art appliances use a simple on/off time switch to excite the heat sealing elements. Under the heat seal control mechanism of the prior art, sealing multiple bags without allowing the heat sealing element to cool results in bags beginning to seal before the vacuum process is complete. This causes ineffective seals and prevents complete evacuation of gas from the bags, that results in expensive packaging bag waste. Further, activating the elements without considering real-time temperature may cause damage to the appliance due to element overheating.

[0008] Therefore there exists a need for a vacuum packaging appliance that accurately controls the temperature of the heat sealing elements and optimizes the placement of the heat sealing elements within the appliance.

SUMMARY OF THE INVENTION

[0009] The present invention sets forth several embodiments relating to the position and control of heat sealing elements within a vacuum packaging appliance. The appliance comprises a lid adapted to define a vacuum chamber when it is moved to a closed position relative to a trough in the base of the device. A heat sealing element is mounted in close proximity to the trough. In another embodiment, the heat sealing element is mounted on the lid of the device and comes into contact with the vacuum bag when the lid is in a closed position. The placement of the heat sealing element adjacent to the trough minimizes wasted bag material as the heat seal is placed closer to the end of the bag itself.

[0010] In addition to the positioning of the heat sealing elements, the present invention also includes the controlling of these heat sealing elements. These embodiments provide features such as a heat sealing controller that allows an operator to select a type of heat seal formed on the evacuated container. The heat sealing controller controls the electrical current supplied to the heat sealing element as selected using a control panel that allows the operator to select between 3 types of heat seals. The control panel is operatively connected to the heat sealing element controller. The heat sealing element controller may also suspend heat sealing operations for a predetermined period of time in order to avoid heat seal element overheating. The controller also can adjust the duration of control signals applied to the heat sealing elements based on parameters such as the real-time temperature of the elements and the amount of liquid sensed in the trough while evacuating the container.

[0011] The present invention includes a method for controlling a vacuum packaging appliance that comprises the acts of coupling a vacuum packaging receptacle to a vacuum circuit, hermetically separating said vacuum circuit from ambient, operating a vacuum pump to obtain a desired vacuum within said vacuum packaging receptacle, sensing

an input related to the control of a heat sealing element, determining an actuation control signal for energizing the heat sealing element as a function of the input, and then applying an actuation control signal to the heat sealing element.

[0012] In the embodiments disclosed, the input used to control the heat sealing element may be any one or a combination of inputs such as temperature, type of heat seal selected by an operator, and amount of liquid sensed in a trough. In another embodiment, the heat seal element controller may increase or decrease the current provided to the heat sealing elements to maintain a constant element temperature or maintain the element within a predetermined temperature range. This type of feedback control allows for precise temperature control. In still another embodiment, the controller may send a signal to direct the vacuum pump exhaust under the heat sealing elements in order to cool the elements if the sealing elements have exceeded a predetermined temperature.

[0013] In still further embodiments, the heat sealing element provided is comprised of two sealing wires. In order to more accurately control the temperature of the heat sealing elements and operations, one or both wires may be activated. For example when liquids are present a heavy seal is desired so both wires are activated. If the temperature of the elements is already hot, only one wire may be activated for sealing purposes. The heat sealing controller performs the controlling of the elements.

[0014] The present invention therefore optimizes the placement and temperature control of the heat sealing elements within a vacuum packaging appliance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] **FIG. 1** is an isometric view of one embodiment of the vacuum packaging apparatus of the invention with the lid in a closed position.

[0016] **FIG. 2** is an isometric view of the underside of the apparatus shown in **FIG. 1**.

[0017] **FIG. 3** is an expanded isometric view of the control panel of the apparatus shown in **FIG. 1**.

[0018] **FIG. 4** is an isometric view of the apparatus shown in **FIG. 1** with the lid in an open position.

[0019] **FIG. 5** is an isometric view of the apparatus shown in **FIG. 1** with the lid in an open position and with the trough removed from the apparatus.

[0020] **FIG. 6** is an isometric view of the trough removed from the apparatus.

[0021] **FIG. 7** is transverse cross-sectional view of the device shown in **FIG. 1**.

[0022] **FIG. 8** is another embodiment of a transverse cross-sectional view of the device shown in **FIG. 1**.

[0023] **FIG. 8A** is another embodiment of the heat sealing element wires.

[0024] **FIG. 9** is schematic diagram of the control circuitry of the heat sealing element.

[0025] **FIG. 10** is a flowchart showing method steps of the present invention.

[0026] **FIG. 11** shows a vacuum sealed bag in accordance with the present invention.

[0027] **FIG. 12** shows a Prior Art vacuum sealed bag.

[0028] **FIG. 13** is a flowchart showing method steps of the present invention.

[0029] **FIG. 14** is a flowchart showing method steps of the present invention.

[0030] **FIG. 15** is a flowchart showing method steps of the present invention.

[0031] **FIG. 16** is a flowchart showing method steps of the present invention.

[0032] **FIG. 17** is a flowchart showing method steps of the present invention.

[0033] **FIG. 18** is a flowchart showing method steps of the present invention.

[0034] **FIG. 19** is a flowchart showing method steps of the present invention.

[0035] **FIG. 20** is a flowchart showing method steps of the present invention.

DETAILED DESCRIPTION

[0036] The present invention sets forth several embodiments relating to the position and control of heat sealing elements within a vacuum packaging appliance. The heat sealing element may be mounted on the lid or the base of the appliance. The placement of the heat sealing element within the appliance minimizes wasted bag material, as the heat seal is placed closer to the end of the bag itself The present invention also includes a heat sealing controller that may adjust the amount of current applied to the heat sealing element based on a number of different inputs. It will be understood by those skilled in the art that the description of the methods and structures of the vacuum packaging appliance described below is not intended to be limiting in anyway.

[0037] **FIG. 1** shows a vacuum packaging appliance **100** for vacuum packaging articles in a container. The vacuum packaging appliance **100** has a lid **102** and a base **104** that are pivotally connected at a back side **106** of the appliance **100**. The lid includes a blade handle **108** that is associated with a blade (not shown) that is slideably engaged within a slot **110** that extends substantially the entire length of the vacuum packaging appliance **100**. The blade is for cutting sections of flexible vacuum bag material that may be stored inside the appliance **100**.

[0038] **FIG. 1** also shows that the base **104** of the vacuum packaging appliance **100** includes an aperture **112** that is covered by a door **114**. The door **114** is slideably mounted in the interior of the base **104** and includes a protrusion **116** that allows a used to more easily slide the door **114** between an open and closed position. A trough for collecting debris may be placed into the appliance **100** through this door **114**. A control panel **118** is coupled with the base **104** and extends above the lid **102**. As will be described with reference to **FIGS. 3 and 9**, the control panel **118** provides and allows operator input to control the heat sealing process of the vacuum packaging appliance **100**.

[0039] **FIG. 2** is an isometric view of the underside of the vacuum packaging appliance **100**. The vacuum packaging appliance **100** includes an alternating current (AC) power cord **202** that is coupled with the base **104**. The base **104** also has a recess **204** for storage of the power cord **202**. To at least partially retain the power cord in the recess **204**, the base also includes cord retention flanges **206**. In the embodiment shown in **FIG. 2**, the power cord **202** will supply electrical power to the heating elements and the vacuum pump of the vacuum packaging appliance **100**.

[0040] **FIG. 3** is a magnified view of the control panel shown in **FIG. 1**. The control panel **118** has a face plate **302** that is removably coupled with the base **104**. The control panel **118** has a rotary dial **304**, a cancel control button **306**, an instant seal button **308**, an extended vacuum control button **310**, an accessory port **312** and an indicator light **314**. In alternate embodiments, various other controls maybe included in the control panel **118** and/or various controls maybe excluded from the control panel **118**.

[0041] The rotary dial **304** has multiple positions that can control various aspects of the vacuum packaging appliance **100**, for example: "Accessory", **1**, **2**, **3** and "Seal Only". However in other embodiments, the rotary dial may have more or fewer settings that can control various aspects of the vacuum packaging appliance **100**. When the rotary dial **304** is in the accessory position, the accessory port **312** is activated and accessories (not shown) can be attached to the vacuum packaging appliance **100** either directly or via a vacuum hose. When the rotary dial **304** is in any position other than the accessory position, the accessory port **312** is sealed off and a vacuum is not drawn through the accessory port **312**.

[0042] Positions **1**, **2** and **3** of the rotary dial **304** allow the user to control the duration of the evacuation process and the length of time the heat sealing element is activated. Position **1** may activate the sealing mechanism for a first predetermined period producing a light seal. Position **2** may activate the sealing mechanism for a second predetermined period producing a medium heat seal, and position **3** may activate the sealing mechanism for a third predetermined period resulting in a heavy heat seal. Position **1** would correspond to a fragile content mode, wherein an actuation control signal would have a sealing time period shorter than a normal content mode sealing time period. Thus, the user can select the duration of the sealing process. For example sealing potato chips or fruit may require a fragile or light seal; whereas sealing meat would require a heavy seal. The seal only position allows a user to use the apparatus to operate a sealing mechanism only, without requiring evacuation of a primary evacuation chamber.

[0043] Although the apparatus shown in **FIG. 3** includes a rotary dial **304** with five positions, in alternate embodiments the apparatus can include a rotary dial **304** that has more or fewer positions. For example a "smart seal" setting may be included. When the "smart seal" is selected the appliance automatically controls the current to the heat sealing elements in accordance with the actual element temperature. After repetitive uses the heat sealing elements may become hot; therefore it requires less electrical power to heat the sealing elements to a sealing temperature. The control of the heat sealing elements is described below with reference to **FIG. 9**.

[0044] The cancel button **306** allows a user to cancel a vacuum operation or sealing operation at any time during the operation. The instant seal button **308** allows a user to terminate the evacuation process and begin the sealing process at any time during operation of the vacuum packaging appliance **100**. The extended vacuum button **310** allows a user to extend the length of time for which the container (not shown) is evacuated. The accessory port **312** allows a user to connect the apparatus to various containers as described in U.S. Pat. 4,491,310, by Hanns J. Kristen, issued Jul. 17, 1990, and assigned to the same assignee as this patent application, the complete contents of which is incorporated herein by reference.

[0045] The indicator light **314** serves to notify a user of the status of the vacuum packaging appliance **100**. In the embodiment shown in **FIG. 3**, the indicator light is off when the device is inactive, solid green while the device is actively evacuating a container and emits intermittent green flashes when the device is sealing a container. However, in alternate embodiment the light may emit light of various colors and/or intensities and/or at various intervals to indicate various operations that the machine is performing. For example, the indicator light **314** may flash amber or some other color to indicate that the device is currently drawing an extended vacuum or the indicator light **314** may glow red to indicate that the accessory port **312** is active. In still further alternate embodiments, the control panel **118** may not include an indicator light **314**.

[0046] **FIG. 4** is an isometric view of the apparatus **100** shown in **FIG. 1** with the lid **102** in an open position. The lid **102** includes a primary evacuation chamber **408** that is surrounded by a flexible gasket **406**. The primary evacuation chamber **408** is coupled to a vacuum source housed inside the vacuum packaging appliance **100**. The lid also includes a heat sealing element **433**. The heat sealing element **433** touches electrical contacts **431** and **432** on the base of the device when the lid is closed. In this manner power is supplied to the heat sealing element via the contacts. This is desirable, as no power cord is necessary to run through the device hinges into the lid **102**. This reduces the complexity of the device itself In alternate embodiments, the heat sealing element may be 2 wires or a wider element to ensure a proper heat seal.

[0047] The base **104** of the vacuum packaging appliance **100** includes an electromechanical switch **416**, positioned on the base such that when the lid **102** is in a closed position, the protrusion **414** is substantially vertically aligned with the electromechanical switch **416**. Thus, when the lid **102** is in a closed position and then is further depressed, the protrusion **414** can actuate the electromechanical switch **416** and activate the vacuum packaging appliance **100**.

[0048] The base **104** of the vacuum packaging appliance **100** shown in **FIG. 4** has a recess **422** that is adapted to hold container material **424**. The vacuum packaging container material **424** is a roll of flattened, tubular container material and is supported on rotational supports **426**. The rotation supports **426** are designed to engage the ends of the roll of container material **424** and rotate freely within the recess **422**. In a further embodiment, the roll or container material **424** may simply be place or stored in the recess **422** without any support mechanism to facility dispensing the container material **424**.

[0049] The roll of container material may be a single roll of continuously bonded plastic as described in U.S. Pat. No. RE34,929, by Hanns J. Kristen, issued May 9, 1995 a reissue patent based on U.S. Pat. No. 4,756,422, by Hanns J. Kristen, issued Jul. 12, 1988, assigned to the assignee of the present application, the complete contents of which is incorporated herein by reference. However, in alternate embodiments, the roll of container material **424** may be any convenient material.

[0050] The thermal sealing mechanism **433** includes one or more electrically conductive wires that produce heat when a voltage differential is applied across the length of the wire. In the embodiment shown, the electrically conductive wires are covered with a Teflon tape. However, in alternate embodiments, the wires maybe exposed or wrapped in a material. If the sealing mechanism **433** is activated and container material **424** is disposed between the sealing gasket **406** and the sealing mechanism **433**, the container material **424** can be hermetically sealed. Although the apparatus **100** is described as including a sealing mechanism **433** that is integrated with the apparatus, in alternate embodiments, the sealing mechanism **433** may be on the base of the device while the electrical contacts are located on the lid. Additionally in alternate embodiments, various other placements of the heat sealing mechanisms **433** may be employed in order to seal the container material **424**.

[0051] In operation, when the lid **102** is in a closed position and is depressed such that the protrusion **414** actuates the electromechanical switch **416**, the vacuum pump or source is activated. Evacuation of the primary evacuation chamber **404** and trough **430** is then performed. When the lid **102** is in a closed position, the gasket **406** surrounding the primary evacuation chamber **408** and the trough **430** are substantially vertically aligned such that a vacuum circuit is obtained or formed.

[0052] For cleaning purposes, the trough **430** is removable from the base **104** of the vacuum packaging appliance **100** through the aperture **112** when the door **114** is in an open position. In the embodiment shown in **FIG. 4** the door **114** is manually slideable between and open and a closed position. However, in alternate embodiments, the door can be mechanically operated and/or can open in any convenient fashion. In still further alternate embodiments, the door **114** may not be present.

[0053] In operation, a user inserts an open end of a container, such as a flexible bag, into the trough **430** or attaches a container to the accessory port **312**. The user then selects a setting on the rotary dial **304**, closes the lid **102** and depresses the lid **102** past the closed position to actuate the electromechanical switch **416** with the protrusion **414**. The vacuum source **434** will then evacuate the latch chambers **402** to hold the lid **102** relative to the base **104**. Once the lid **102** is secured relative to the base **104**, the primary evacuation chamber **408** and the trough **430** are evacuated thus evacuating the open container inserted into the appliance **100**. When the vacuum strength reaches a predetermined level, the sealing mechanism **433** will be activated to seal the container. The evacuated and sealed container may then be released from the vacuum packaging appliance **100**.

[0054] **FIG. 5** is an isometric view of the apparatus shown in **FIG. 4** with the trough **430** removed and the door **114** in an open position. The embodiment shows a recess **502** in which the trough **430** may be inserted and removed. The recess **502** has retention flanges **504** that are designed to prevent substantial vertical and rotational movement of the trough **430** within the recess **502**. The recess **502** has a slot **506** at the end of the recess **502** opposite the door **114**. The slot **506** is designed to mate with a protrusion in the trough **430** in a snap-fit manner. The snap-fit mating of the slot **506** and the recess in the trough **430** is designed to restrict horizontal movement of the trough **430** within the recess **502**.

[0055] **FIG. 6** is an isometric view of the trough **430**. The trough **430** includes an extension that includes a protrusion **602**. The protrusion **602** is designed to mate with the slot **506** in a snap-fit manner. The embodiment shown in **FIG. 6** includes flanges **604** that, as described with reference to **FIG. 5**, are designed to engage with the retention flanges **504**. The embodiment shown in FIG. **6** also includes a handle **606**. The handle is included to facilitate removal and insertion of the trough **430**.

[0056] **FIG. 7** is a sectional view of the apparatus shown in **FIG. 1**, cut along the section line A-A. **FIG. 7** shows the lid **102** in a closed position relative to the base **104**. The base **104** includes the thermal sealing mechanism **420** that is positioned in substantial vertical alignment with the sealing gasket **406** in the lid **102** of the appliance. When the lid **102** is in a closed position relative to the base **104**, the gasket **406** that surrounds the primary evacuation chamber **408** and the trough **430** are in substantial vertical alignment and are in contact, thus defining an evacuation chamber. The embodiment shown in **FIG. 7** also shows a roll of container material **424** that is stored within the appliance **100**, and a vacuum pump **434**.

[0057] The embodiment of **FIG. 7** shows a heat sealing element **420** mounted adjacent to the trough **430**. In operation, the element **420** receives electrical current from a power source or sources that causes the element to heat up to temperatures exceeding 130 degrees thereby heat sealing the vacuum bag. As the location of the heat sealing element **420** is behind the gasket **406**, this results in a seal that is close to the bag edge which results in the minimization of bag material necessary for packaging. Sensor **90** is a temperature sensor and is located adjacent to the sealing elements **420**. Sensor **91** is a liquid sensor that senses the amount and presence of liquid in the trough **430**. Both these sensors feed signals back to a controller as shown in **FIG. 9**, that supplies power via control signals to the heat sealing elements **420**. The present invention is described as a piston-type vacuum, however the vacuum source **434** may be any convenient mechanism capable of drawing a vacuum.

[0058] **FIG. 8** shows a vacuum sealable container **804** being placed into the appliance. In this embodiment the front side of the trough **430** includes the heat sealing elements **420** and an extension that includes a protrusion **802**. The protrusion **802** is designed to seal the evacuation chamber and trough with the gasket **406**. This view of the appliance shows the vacuum chamber **430** and lid **102** in an open position. A vacuum packaging bag **804** that is designed to be heat sealed by elements **420** is placed into the front of the appliance by the user. The gasket **406** is one continuous loop around the rectangular trough and vacuum chamber **430**. The front side of gasket **406** is wider than the back side of the gasket. The

gasket **406** is wider on the front side as the gasket **406** is performing multiple functions and this ensures that a proper vacuum seal is obtained.

[**0059**] As can be seen from **FIG. 8**, the gasket is used to create a seal but also to hold the vacuum packaging receptacle **804** in contact with the heat sealing elements **420** located adjacent to the trough **430**. The presence of the bag **804** also requires a wider gasket **406** to ensure a proper seal. The back side of the gasket **406** does not perform multiple functions as the front side does, therefore it may be smaller in width. The gasket **406** is also only located on the lid **102** of the appliance. In this embodiment there is no need for an additional gasket mounted around the trough in the base of the appliance. This is another feature and advantage of the present invention.

[**0060**] Also shown in **FIG. 8** are valves **808** and **812** and passages **806** and **810**. The valve **808** is electrically controlled (by a controller as shown in **FIG. 9**) and is used to open and close an opening into a passageway **806**. When the valve **808** is opened, the exhaust from the vacuum pump is directed through the passage **806**. The passage runs underneath the entire length of the heating elements **420**. The exhaust moving through the passage provides a cooling effect to reduce the temperature of the elements **420**. After the exhaust has passed through the passage **806** and cooled the elements, the exhaust travels through an exit passage **810** and an exit valve **812**.

[**0061**] The opening of the valve **808** is controlled by a signal from a heat sealing element controller that receives a temperature sensor input. The valve **808** is opened by the controller in response to a predetermined temperature of the heat sealing elements being exceeded. For example, if the heat-sealing layer of the vacuum packaging bag melts at 130 degrees, the predetermined temperature may be set at 120 degrees. This ensures that the heat sealing elements **420** stay below a melting temperature, so as to not prematurely produce a heat seal while the vacuum packaging bag is being evacuated. The controller may also open and close the valve **808** as necessary, in order to keep the heat sealing elements at a constant predetermined temperature or within some range below the predetermined temperature. A flowchart of the steps in this process is shown in **FIG. 19**.

[**0062**] **FIG. 8A** shows an embodiment of the present invention wherein the vacuum packaging appliance has two heat sealing elements. **FIG. 8A** shows a view looking at the base of the appliance **104** from above, as a vacuum bag **804** is placed in to the appliance and into the trough **430**. In this embodiment the heat sealing elements are comprised of two separate wires, **441** and **442**. Each wire when actuated with a current signal from a controller, becomes hot enough to melt the sealing layer of the vacuum packaging receptacle **804**. As will be described below with reference to **FIGS. 9 and 13-18**, these two heat sealing element wires **441** and **442** are individually controlled to allow for precise temperature control based on a number of predetermined settings and/or predetermined conditions. For example, heavy seals are created by energizing both wires, while lighter seals are produced energizing only one of the two wires **441** or **442**, wherein the heavy and light seals may be desired for a variety of reasons as described below.

[**0063**] A schematic diagram of the control circuitry of the heat sealing element is shown in **FIG. 9**. Included is the temperature sensor **90** that feeds a real-time temperature signal back to the controller **92**. The controller **92** is an application specific integrated circuit or (ASIC) device. The controller **92** may also be a programmable logic device (PLD) or any other type of microprocessing device capable of being programmed to control the functions of the vacuum packaging appliance as described herein. As mentioned above, problems with overheating and faulty sealing result from inaccurate temperature control of the heat sealing elements **420**. The sensor **90** allows the controller **92** to supply more or less electrical power to the elements based on this temperature. For example a standard heavy seal would be to supply current to the elements for 5 seconds creating a vacuum bag temperature of 130 degrees (required to melt the interior heat sealing layer). If the present heat sealing element temperature is already 110 degrees, a heavy seal may be produced by only supplying current for a duration of 2 seconds. This process thereby increases the power efficiency of the appliance and does not damage the heat sealing elements **420** by overheating them with a full 5 second duration heavy seal pulse. In addition to changing the pulse duration, the controller may also change the amplitude of the pulse or change both amplitude and duration if desired. When controlling actuation pulses to the two elements as shown in **FIG. 8A**, the controller **92** may actuate only one of the wires **441** or **442** based on temperature conditions as described above. For example, if the elements are already warm, only one element **441** is energized. If the elements are cool, both wires **441** and **442** are actuated by the controller **92**.

[**0064**] The liquid sensor **91** feeds a signal back to the controller **92** indicating the presence or amount of liquid in the trough **430**. This is important as the presence of liquids may require higher sealing temperatures of the elements **420**, as liquids tend to reduce the effects of the heat sealing elements. Therefore the controller **92** would produce a heat seal activation signal of greater duration when liquids are present, or send sealing actuation pulses to both sealing elements **441** and **442** as shown in **FIG. 8A**. **FIG. 15** shows this process in detail. Regarding the details of the liquid sensor, patent application with Ser. No. 60/492,046, entitled "Fluid Sensing in a Drip Tray", by inventors Charles Wade Albritton, Landon Higer and John Peters, which is hereby incorporated by reference.

[**0065**] **FIG. 10** shows a method of controlling the vacuum packaging device. In step **S10** the process is begun when the operator seals a first end of the container bags. It may be desired to seal a first and second end of the vacuum bags in the exact same manner by the operator. Sealing both ends of the bag in the same manner ensures an ease of operation that results in less operator errors and thereby decreases the wasted bag material. After a first end of the bag has been sealed the operator places items to be packaged into the bag. The bag that is ready for sealing is then placed into the device for evacuating and heat sealing the second end of the container in step **S20**. In step **S30** the operator selects the appropriate type of seal. In step **S40** the heat sealing element may be moved into position by closing the lid of the device itself In step **S50** the heat sealing controller instigates the chosen type of seal by controlling the current to the sealing element or elements. As described above, the heat sealing process is controlled by the controller **92** in accordance with the inputs from multiple sensors and internal logic and programming. The process is then finished in step **S60**.

[0066] The sealed bag of the present invention is shown in **FIG. 11**. The vacuum sealed container **10** has heat seals **11** and **12** after being processed by the vacuum packaging appliance. The length of bag material between the ends and the heat seals **11** and **12** is minimized. By incorporating the heat sealing element adjacent to the trough, the seal may be placed closer to the container end, thereby resulting in less bag waste. This is a substantial improvement over prior art bags as shown in **FIG. 12**. **FIG. 12** shows heat seals **21** and **22** that are far from the bag ends resulting in substantial waste and cost to the user.

[0067] **FIG. 13** shows a method **1300** of controlling the vacuum packaging device. In step **S1302** the process begins when the operator couples the storage receptacle to the vacuum circuit by placing the container into the vacuum packaging appliance. In step **S1304**, the vacuum circuit is closed when the operator closes the lid of the device. In step **S1306** the type of heat seal is determined. As is described below and as shown in **FIGS. 14-18**, this step may contain inputs from a variety of parameters in order to determine the exact nature of the control signal applied to the heat sealing elements. In step **S1308** the container is evacuated and is ready for sealing. In step **S1310** the heat sealing element is actuated according to the determined control signal. This step may include determining if one or both wires **441** and **442** (as shown in **FIG. 8A**) are to be actuated. In step **S1312** feedback of the heat sealing process is provided to the user. For example lights on the control panel may indicate that sealing is being performed and/or that the heat sealing process is complete. As shown in **FIG. 9**, the heat sealing controller determines and actuates the current provided to the heat sealing element. As described above, the heat sealing process is controlled by the controller **92** in accordance with the inputs from multiple sensors and internal logic and programming.

[0068] **FIG. 14** shows in more detail how the control signal is determined in step **S1310** above. The process begins in step **S1402** by receiving the user input regarding the type of heat seal selected. This input comes from the control panel shown in **FIG. 3** and described above. In step **S1404** the proper control signal is determined by the controller **92**. In this manner the time of the control signal to the heat sealing elements is input. As will be described below, the control signal set by the operator may change in accordance with the amount of liquid sensed in the trough and/or the temperature of the heating elements.

[0069] **FIG. 15** shows in more detail how the control signal may be adjusted in step **S1310** above. The process begins in step **S1502** by monitoring the presence and amount of liquid in the trough during the evacuation process in step **S1308**. The liquid sensing electrodes as shown in **FIG. 7** provide this information to the controller circuit **92**. In step **S1504** it is determined by the controller if a predetermined threshold of liquid has been exceeded. If the liquid is below a certain level, step **S1508** is enacted and the time of the control signal to the heat sealing elements is set to a normal period (as set by the operator). If it has been determined in step **S1504** that a predetermined amount of liquid is present, step **S1506** adjusts the set time of the control signal to the elements to be high or energizes both heat sealing wires **441** and **442** as shown in **FIG. 8A**. By incorporating the liquid sensing electrodes into the trough of the appliance, the heat seal may be controlled in a more precise manner, thereby resulting in less bag waste. This is a substantial improvement over prior art devices that are incapable of monitoring and adjusting the heat sealing process in accordance with the amount of liquid detected during the evacuation process.

[0070] **FIG. 16** also shows in detail how the control signal is determined in step **S1310** above. The process begins in step **S1602** by monitoring the present temperature of the heat sealing elements. The temperature sensor as shown in **FIG. 7** provides this information to the controller circuit **92**. In step **S1604** the controller determines if a predetermined threshold of temperature has been exceeded. If the temperature is below a certain level, step **S1608** is enacted and the vacuum packaging appliance continues with the evacuating and heat sealing operations in a normal manner. If it has been determined in step **S1604** that a predetermined temperature has been exceeded, step **S1606** waits or suspends operations for a predetermined period of time until the heat sealing elements have cooled.

[0071] By incorporating the temperature sensor adjacent to the trough of the appliance, the heat seal may be controlled in a more precise manner, thereby resulting in less bag waste. This is a substantial improvement over prior art devices that are incapable of monitoring and adjusting the heat sealing process in accordance with a plurality of sensor inputs and control modes.

[0072] In addition to suspending the heat sealing operations as described above, the present invention is also capable of adjusting the control signal times based on the temperature of the elements. **FIG. 17** shows a flowchart of steps **1700** enacted by the controller **92**. The controller **92** stores control signal times for all the heat seal settings from which the operator may select. A light or heavy seal control signal time duration may also be increased or decreased based on the real-time feedback of the temperature of the heat sealing elements. The controller **92** may therefore be programmed to keep the heat sealing elements at a constant temperature while sealing or within a predetermined temperature range while sealing.

[0073] The process begins in step **S1702** when the temperature of the heat sealing elements is detected and sent to the controller. In step **S1704** the controller adjusts the duration of the control signal applied to the heat sealing elements based on their real-time detected temperature. As per the algorithm mentioned above, more or less current may be applied to the elements based on their sensed temperature. For example a warm heating element may require 3 seconds of current to produce a seal, whereas a cold heat sealing element may require 5 seconds of current to produce a similar heat seal. In addition to varying the activation signal duration, other embodiments may adjust the amplitude and/or duration of the control signal in a real-time manner as applied to each individual sealing wire **441** and **442** as shown in **FIG. 8A**. Step **S1704** may also include waiting for the heat sealing elements to cool down.

[0074] The algorithm enacted by controller **92** can also adjust waiting times for cooling periods. For example a wait time of 20 seconds may be required for a hot element at 150 degrees to cool down to 100 degrees, and a wait time of 10 seconds may be required for an element at 135 degrees to cool to 100 degrees. It is also contemplated that the algorithm can maintain the element temperature at some constant temperature during the sealing process.

[0075] **FIG. 18** shows another method of the present invention. In this method the controller **92** adjusts the control signal provided to the elements based on inputs from the control panel, the temperature of the heat sealing elements, and the amount of liquid sensed in the trough. The process begins in step **S1802** by receiving the user selected type of heat seal. In step **S1804** the controller receives information regarding the temperature of the heat sealing elements from the temperature sensor **90**. In step **S1806** the controller receives information regarding the amount of liquid in the trough from the liquid sensor **91**. In step **S1808** the controller takes into account all the information described above and adjusts the control signal based on the selected seal setting, the temperature of the elements and the amount of liquid in the trough. The appropriate control signal is then sent from the controller to actuate the sealing elements in step **S1810**.

[0076] For example, the operator may select a medium heat seal which would have a control signal duration of 4 seconds. If the temperature of the heat sealing elements was detected to be 110 degrees, 0.5 seconds of time duration may be subtracted from the control signal, as the heat sealing elements are already warm. If a substantial amount of liquid is detected by the liquid sensors, the controller may add 1.0 second of time to the duration of the control signal. This results in an appropriate control signal duration of 4.5 seconds to be applied to the heat sealing elements. The controller **92** may use an algorithm or look-up table to determine these adjusted control signal periods based on these pertinent parameters.

[0077] In another embodiment, the process as shown in **FIG. 18** is also applied to the heat sealing wires as shown in **FIG. 8A**. In this environment, the controller **92** adjusts the control signal (in an on/off manner) provided to the plurality of elements based on inputs from the control panel, the temperature of the heat sealing elements, and the amount of liquid sensed in the trough. For example, when the elements are detected to be hot (a predetermined temperature has been exceeded) as sensed by the temperature sensor, only one of the two wires may be energized. When liquids are detected, both wires **441** and **442** are activated to ensure that the presence of liquid does not effect the heat seal. The operator may also select a "light" or "heavy" seal by using the control panel switches. In this instance a "light" seal would activate only one wire, while a "heavy" seal wold activate both wires.

[0078] **FIG. 19** shows a flowchart of steps in another embodiment of the present invention. The process begins in step **S1902** by monitoring the present temperature of the heat sealing elements as the vacuum packaging appliance is evacuating a receptacle. The temperature sensor as shown in **FIG. 7** provides this information to the controller circuit **92**. In step **S1904** the controller determines if a predetermined threshold of temperature has been exceeded. If the temperature is below a certain level, step **S1908** is enacted and the vacuum packaging appliance continues with the evacuating and heat sealing operations in a normal manner.

[0079] If it has been determined in step **S1904** that a predetermined temperature has been exceeded, step **S1906** is enacted wherein the controller produces a signal that opens a valve which enables the vacuum pump exhaust to be blown under the heat sealing elements in order to cool the elements. This process provides real-time feedback and control of the heat sealing elements temperature. This process reduces the amount of faulty seals that occur when the elements are warm from previous use and begin to prematurely melt the heat sealing layer within the vacuum packaging bags before they are completely evacuated. This process also ensures that the heat sealing elements maintain an acceptable temperature range so that they may be subsequently controlled by the controller using the methods described above.

[0080] **FIG. 20** illustrates a preheat method according to another embodiment of the present invention. This method is well suited to particularly thick vacuum packaging receptacles and vacuum packaging receptacles that have large ridges or patterns thereon. A step **S100** begins by energizing a sealing mechanism to a preheat level. The preheat step **S100** is typically done in conjunction with an evacuation step, rendering the receptacle ready for easy and prompt sealing. The preheat step **S100** could raise the sealing mechanism temperature to any suitable level, for example somewhat lower than the actual sealing temperature. This prepares the receptacle for actual sealing, but does not initiate substantial sealing that tends to interfere with evacuation. A step **S102** completes the sealing process by fully energizing the heat sealing mechanism.

[0081] The appliances described above show the heat sealing mechanism external to the vacuum chamber. However, the teaching of the present invention works equally well with appliances having the heat sealing mechanism internal to the vacuum chamber. One suitable example of this is commonly assigned U.S. provisional patent application 60/492,090, filed Jul. 31, 2003, and incorporated herein by reference. Additionally, the appliances described illustrate the receptacle external to the vacuum chamber. As will be appreciated, the teachings of the present invention work well with in-chamber vacuum packaging appliances.

[0082] The vacuum packaging device described herein therefore provides numerous embodiments and methods to cool the heat sealing elements and embodiments and methods to control and energize the heat sealing elements that may be used in combination or separately as desired. It will be understood by those skilled in the art that the above-presented description is provided by way of example only and is not intended to be limiting in anyway. Those skilled in the art will readily understand that numerous other embodiments of the invention are contemplated and possible which meet the scope and spirit of the invention.

What is claimed is:

1. A method for controlling a vacuum packaging appliance, said vacuum packaging appliance including a heat sealing element, a vacuum circuit, and a vacuum pump, said vacuum pump operable to evacuate gas from said vacuum circuit, said heat sealing element operable to heat seal a vacuum packaging receptacle, said method comprising:

coupling said vacuum packaging receptacle to said vacuum circuit;

hermetically separating said vacuum circuit from ambient;

operating said vacuum pump to obtain a desired vacuum within said vacuum packaging receptacle;

sensing an input related to control of said heat sealing element;

determining an actuation control signal for energizing said heat sealing element as a function of at least said input; and

applying said actuation control signal to said heat sealing element.

2. A method for controlling a vacuum packaging appliance as recited in claim 1, wherein said vacuum packaging receptacle is a vacuum packaging bag having three sealed sides and one unsealed side, and said coupling includes:

engaging said vacuum circuit with said unsealed side of said vacuum packaging bag.

3. A method for controlling a vacuum packaging appliance as recited in claim 2, wherein said input is related to a temperature of said heat sealing element.

4. A method for controlling a vacuum packaging appliance as recited in claim 1, wherein said input arises from a user activated switch.

5. A method for controlling a vacuum packaging appliance as recited in claim 3, wherein said input arises from a temperature sensor.

6. A method for controlling a vacuum packaging appliance as recited in claim 2, wherein said input corresponds to a high liquid content mode, said actuation control signal corresponding to said high liquid content mode having a high liquid content sealing time period longer than a normal content mode sealing time period.

7. A method for controlling a vacuum packaging appliance as recited in claim 1, wherein said vacuum circuit contains a trough for collecting liquids while operating the vacuum pump.

8. A method for controlling a vacuum packaging appliance as recited in claim 7, wherein said input arises from a sensor monitoring a fluid level present in the trough of said vacuum circuit.

9. A method for controlling a vacuum packaging appliance as recited in claim 5, wherein said heat sealing element is controlled in accordance with a plurality of inputs.

10. A method for controlling a vacuum packaging appliance as recited in claim 9, wherein said vacuum pump operation is delayed until said temperature of said heat sealing element cools to a predefined temperature which tends to prevent premature sealing of said vacuum packaging receptacle.

11. A method for controlling a vacuum packaging appliance as recited in claim 1, wherein said input is related to a time period since said heat sealing element has been actuated.

12. A method for controlling a vacuum packaging appliance as recited in claim 9, wherein a duration and amplitude of said activation control signal may be changed.

13. A method for controlling a vacuum packaging appliance as recited in claim 1, further comprising providing said user feedback related to operation of said heat sealing element.

14. A method for controlling a vacuum packaging appliance as recited in claim 13, further comprising providing said user feedback related to operation of said vacuum pump.

15. A method for controlling a vacuum packaging appliance as recited in claim 14, wherein lights on a control panel provide said user feedback relating to the operation of said heat sealing element and said vacuum pump.

16. A vacuum packaging appliance for evacuating a container comprising:

a base defining an upper support surface adapted to receive an open end of a container;

a lid operatively associated with said base, said lid and said base defining a vacuum chamber therebetween to receive said open end of said container;

at least one gasket surrounding said vacuum chamber for directly engaging said container such that said open end of said container is operatively associated with said vacuum chamber;

a vacuum source operatively associated with said vacuum chamber for selectively evacuating said vacuum chamber and said operatively associated container;

a trough coupled to the base for receiving the open end of a container and collecting contents taken from the container while evacuating said container, wherein a heat sealing element is located adjacent to the trough in order to heat seal the evacuated container; and

a heat sealing controller that allows an operator to select a type of heat seal formed on the evacuated container.

17. The vacuum packaging appliance of claim 16 wherein said heat sealing controller controls the electrical current supplied to the heat sealing element.

18. The vacuum packaging appliance of claim 16 further comprising a control panel that allows the operator to select between 3 types of heat seals.

19. The vacuum packaging appliance of claim 18 wherein said control panel is operatively connected to the heat sealing element controller.

20. The vacuum packaging appliance of claim 18 wherein said heat sealing element controller may suspend heat sealing for a predetermined period of time in order to avoid heat seal element overheating.

21. A method of controlling a vacuum packaging appliance to evacuate and seal a container comprising the acts of:

placing a first end of a container into a trough within a vacuum packaging appliance;

evacuating the container of gases;

selecting a type of heat seal for the container;

positioning a heat sealing element to heat seal the container; and

controlling the amount of current applied to heat sealing elements based on the selected type of seal.

22. The method of claim 21 wherein the heat sealing elements are positioned in the trough of the vacuum sealing device.

23. The method of claim 21 wherein the heat sealing element is positioned on a lid of the vacuum sealing device.

24. The method of claim 21 wherein the heat sealing element is positioned to minimize the length of the container necessary for vacuum sealing.

25. The method of claim 21 wherein controlling the amount of current to the heat sealing element may include waiting a predetermined period of time before supplying current to the heat sealing element in order to avoid overheating or premature sealing of the container.

26. The method of claim 21 wherein controlling the amount of current to the heat sealing element may include controlling the current based on the temperature of the heat sealing elements or the presence of liquid within the trough.

27. A vacuum packaging appliance for evacuating a container comprising:

a trough for receiving the open end of a container and collecting contents taken from the container while evacuating said container,

a heat sealing element located adjacent to the trough in order to heat seal the evacuated container; and

a heat sealing controller that allows an operator to select a type of heat seal formed on the evacuated container.

28. The vacuum packaging appliance of claim 27 wherein said heat sealing controller controls the power supplied to the heat sealing elements.

29. The vacuum packaging appliance of claim 28 wherein a liquid sensor is connected to said heat sealing controller.

30. The vacuum packaging appliance of claim 29 wherein a temperature sensor is connected to said heat sealing controller

31. The vacuum packaging appliance of claim 29 wherein the liquid sensor is located in the trough.

32. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles, said vacuum packaging appliance comprising:

a vacuum pump;

a vacuum circuit coupled to said vacuum pump such that actuation of said vacuum pump evacuates said vacuum circuit, said vacuum circuit intended for evacuating a vacuum packaging receptacle;

a heat sealing element arranged to hermetically seal said vacuum packaging receptacle;

a user input device enabling a user to select a mode of operation from among at least a first and a second operating mode; and

a heat sealing element controller operable to actuate said heat sealing element according to a first control profile associated with said first operating mode and a second control profile associate with said second operating mode, said heat sealing element controller responsive to said user input device.

33. A vacuum packaging appliance as recited in claim 32, wherein said user input device includes a toggle switch configurable to at least a first position corresponding to said first operating mode and a second position corresponding to said second operating mode.

34. A vacuum packaging appliance as recited in claim 32, wherein said heat sealing element controller includes a microprocessor.

35. A vacuum packaging appliance as recited in claim 32, wherein said heat sealing element controller includes an application specific integrated circuit (ASIC).

36. A vacuum packaging appliance as recited in claim 32, wherein said heat sealing element controller includes a programmable logic device (PLD).

37. A vacuum packaging appliance for use in evacuating a vacuum packaging receptacles, said vacuum packaging appliance comprising:

a vacuum pump;

a vacuum circuit coupled to said vacuum pump such that actuation of said vacuum pump evacuates said vacuum circuit, said vacuum circuit intended for evacuating a vacuum packaging receptacle;

a heat sealing element arranged to hermetically seal said vacuum packaging receptacle;

a sensor providing data related to said heat sealing element; and

a heat sealing element controller operable to actuate said heat sealing element according to a control profile that is a function of said data related to said heat sealing element.

38. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles as recited in claim 37, wherein said sensor measures a parameter related to a temperature of said heat sealing element.

39. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles as recited in claim 38, wherein said sensor measures a parameter related to a fluid level in said vacuum circuit.

40. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles, said vacuum packaging appliance comprising:

a vacuum pump;

a vacuum circuit coupled to said vacuum pump such that actuation of said vacuum pump evacuates said vacuum circuit, said vacuum circuit intended for evacuating a vacuum packaging receptacle;

a heat sealing element arranged to hermetically seal said vacuum packaging receptacle;

a control panel to allow an operator to select a type of heat seal for sealing the vacuum packaging receptacle;

a sensor providing data related to a temperature of the heat sealing element;

a sensor providing data related to an amount of liquid present in the vacuum circuit while evacuating the vacuum packaging receptacle; and

a heat sealing element controller operable to actuate said heat sealing element with a control signal; wherein the duration of the control signal is determined by the type of heat seal selected, the temperature of the heat sealing element, and the amount of liquid present.

41. A heat sealing device used in a vacuum packaging appliance comprising:

a heat sealing element for hermetically sealing a vacuum packaging container placed in the vacuum packaging appliance;

a temperature sensor for sensing the temperature of the heat sealing element; and

a heat sealing element controller that controls the temperature of the heat sealing element based on a signal from the temperature sensor.

42. The heat sealing device of claim 41, wherein the heat sealing element controller controls the amount of current applied to the heat sealing element in order to control the temperature of the heat sealing element.

43. The heat sealing device of claim 42, wherein the heat sealing element controller increases the amount of current when the temperature of the heat sealing element is less than a predetermined temperature.

44. The heat sealing device of claim 43, wherein the heat sealing element controller decreases the amount of current when the temperature of the heat sealing element is greater than a predetermined temperature.

45. The heat sealing device of claim 44, wherein the heat sealing element controller maintains the heat sealing element temperature at a constant predetermined temperature.

46. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles, said vacuum packaging appliance comprising:

a vacuum pump;

a heat sealing element arranged to hermetically seal said vacuum packaging receptacle;

a temperature sensor providing data relating to a temperature of the heat sealing element; and

a heat sealing element controller operable to actuate said heat sealing element with a control signal, wherein the heat sealing element controller also directs exhaust of the vacuum pump under the heat sealing element when the temperature of the heat sealing element has exceeded a predetermined temperature.

47. The vacuum packaging appliance of claim 46, wherein the heat sealing element controller sends a signal to open a valve when the temperature exceeds a predetermined temperature.

48. The vacuum packaging appliance of claim 47, wherein the exhaust of the vacuum pump is directed through a passage below the heat sealing element.

49. The vacuum packaging appliance of claim 47, wherein the temperature of the heat sealing element is maintained within a predetermined temperature range.

50. The vacuum packaging appliance of claim 47, wherein the heat sealing element controller provides a signal to activate the heat sealing elements based on one or more inputs.

51. The vacuum packaging appliance of claim 50, wherein the inputs include heat sealing element temperature, amount of liquid present in a trough, and operator selections of desired heat seals.

52. A vacuum packaging appliance for use in evacuating and sealing a vacuum packaging receptacle, said vacuum packaging appliance comprising:

a vacuum pump for evacuating a vacuum packaging receptacle;

heat sealing elements arranged to hermetically seal said vacuum packaging receptacle; wherein the heat sealing elements comprise two wires;

a temperature sensor providing data relating to a temperature of the heat sealing elements; and

a heat sealing elements controller operable to actuate said heat sealing elements with a control signal, wherein the controller determines if one or both of the wires of the heat sealing elements are to be actuated based on a predetermined condition.

53. The vacuum packaging appliance of claim 52, wherein the heat sealing element controller determines that only one wire is to be actuated when the predetermined condition is that a current temperature exceeds a predetermined temperature.

54. The vacuum packaging appliance of claim 52, wherein the heat sealing element controller determines that both wires are to be actuated when the predetermined condition is that a current temperature is below a predetermined temperature.

55. The vacuum packaging appliance of claim 52, wherein the predetermined condition is a user selected mode of operation.

56. The vacuum packaging appliance of claim 52, wherein the heat sealing element controller determines that both wires are to be actuated when the predetermined condition is that the presence of liquid is detected.

57. A method for controlling a vacuum packaging appliance for use in evacuating and sealing a vacuum packaging receptacle, comprising the acts of:

evacuating a vacuum packaging receptacle;

providing two heat sealing element wires to seal the vacuum packaging receptacle;

providing a heat sealing element controller operable to actuate said heat sealing element wires with a control signal, wherein the controller determines if one or both of the wires of the heat sealing elements are to be actuated based on a predetermined condition.

58. A method for controlling a vacuum packaging appliance as in claim 57, wherein the heat sealing element controller determines that only one wire is to be actuated when the predetermined condition is that a current temperature exceeds a predetermined temperature.

59. A method for controlling a vacuum packaging appliance as in claim 57, wherein the heat sealing element controller determines that both wires are to be actuated when the predetermined condition is that a current temperature is below a predetermined temperature.

60. A method for controlling a vacuum packaging appliance as in claim 57, wherein the predetermined condition is a user selected mode of operation.

61. A method for controlling a vacuum packaging appliance as in claim 57, wherein the predetermined condition is that the presence of liquid is detected.

62. A method for controlling a vacuum packaging appliance having an evacuation mechanism and a sealing mechanism, the method comprising:

preheat energizing a sealing mechanism in order to preheat bag material disposed within the vacuum packaging appliance; and

seal energizing the sealing mechanism in order to seal the bag material disposed within the vacuum packaging appliance.

63. A method as recited in claim 62, wherein the preheat energizing step is performed in conjunction with an evacuation step.

64. A method as recited in claim 63, wherein the preheat energizing step brings the sealing mechanism to a lower temperature than the seal energizing step.

65. A vacuum packaging appliance for use in evacuating vacuum packaging receptacles, said vacuum packaging appliance comprising:

a vacuum pump coupled with a vacuum chamber, said vacuum chamber arranged to receive a vacuum packaging receptacle;

a heat sealing element arranged to hermetically seal said vacuum packaging receptacle, said heat sealing element disposed inside of said vacuum chamber;

a temperature sensor providing data relating to a temperature of the heat sealing element; and

a heat sealing element controller operable to actuate said heat sealing element with a control signal, wherein the heat sealing element controller also directs exhaust of the vacuum pump under the heat sealing element when the temperature of the heat sealing element has exceeded a predetermined temperature.

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