

HOT WATER JUG

This invention relates to a hot water jug of the type including an electric immersion heater or a
5 similarly constructed heater mounted in thermal contact with the underside of the base of the jug. Such heaters traditionally terminate in so-called "cold leads" by means of which electrical connections are made to the heater, and jugs of this type are hereinafter called
10 "jugs" of the kind described. Such continental style jugs, usually made principally of plastic, but also known in metal, have become increasingly popular in the United Kingdom in recent years and are now used instead of traditional electric kettles in many households.

15 Jugs of this type generally include a thermally-sensitive control having switch means adapted and arranged to disable the heater upon overheating thereof e.g. in the event of the jug boiling dry or being switched on with insufficient liquid in the jug to cover
20 the element. A further switch means is usually provided to disable the heater when boiling occurs, and more recently a back-up protector switch means has been proposed to prevent serious over-heating in the event of failure of the primary switch-on-dry sensitive switch
25 means.

Traditionally electrical power has been supplied to such jugs via a detachable female socket connector which is engagable with a terminal pin connector mounted to the jug or to the thermally-sensitive heater control and
30 connected to the heater via switch means of the type discussed above; the pins extend horizontally so that the socket connector is engaged and disengaged laterally with respect to the jug, in a manner similar to a traditional electric kettle. However, more recently
35 "cordless"

jugs have been proposed, which are so-called because the jug itself is not engaged by a separate socket connector in the traditional manner, but rather the socket connector forms parts of a free standing base unit defining a receiving area for the lower part of the jug.

In such an arrangement, the terminal pins of the jug are arranged vertically on the underside of the jug for engagement with the socket connector, which is likewise vertically orientated, when the jug is placed on its corresponding base unit; it is therefore the base unit, rather than the jug, which is seen to be connected to the mains power supply lead.

With this system problems can however arise due to electrical arcing between the socket connector and the terminal pins if engagement therebetween occurs with the socket connector connected to the mains (as is common) and with the terminal pins connected to the heater, i.e. when the heater is actually switched on by the action of interengaging the socket connector and pins as the container is placed on the base unit. The problem of arcing can be greater in the case of a cordless jug than with a jug adapted for engagement with a traditional socket connector, since the force and speed of engagement of the connector with the pins will typically be less in the former arrangement. It has been proposed to avoid this problem by incorporating a micro-switch in the base unit arranged to isolate the socket connector from the mains until such time as the jug is properly engaged with the base unit. It has also been proposed to provide a mechanical interlock between a steam-sensitive switch means of the jug and the base unit arranged to prevent manual operation to close such switch means until the jug is engaged with the base. Both these systems

are however relatively expensive, and the latter one is also vulnerable to the user attempting to force the steam switch "on" when the jug is not properly engaged with its base unit.

5 The invention provides a hot water jug of the kind described which is adapted to be detachably interengaged with a corresponding base unit therefor whereby terminal pins of an electrical connector arranged in a lower region of the jug are engaged with a female socket
10 connector forming part of the base unit for the supply of electrical power to the heater of the jug, wherein the jug comprises a thermally-sensitive control unit mounted to or adjacent the cold leads of the heater, the control unit comprising electrical switch means with at
15 least one set of switch contacts connected between said terminal pin connector and the heater, such contacts being breakable in response to operation of a thermally-sensitive actuating means mounted in good thermal contact with the heater so as to interrupt the
20 power supply to the heater in the event of the element thereof overheating, the jug further comprising a heater disabling mechanism associated with the same or further set of switch contacts of the switch means of said control unit, such mechanism including an operating
25 member which co-operates with the contacts and which is movable between a first position wherein the contacts are broken so that the heater is isolated from the terminal pin connector and a second position wherein the contacts are closed, there being resilient means acting
30 to maintain the operating member in its first position, and an actuating element arranged to co-operate with the base unit or socket connector thereof when said jug is engaged with the base unit as aforesaid so as to cause or permit movement of the operating member to its second
35 position by overcoming or relaxing the force exerted thereon by the resilient means, whereby the contacts are only closed once electrical contact has been made

between the terminal pin connector of the jug and the socket connector of the base unit.

5 With this arrangement the problem discussed above of arcing between the terminal pins and socket connector is avoided.

10 Furthermore, the association of the heater disabling mechanism with the switch-means of a so-called switch-on-dry sensitive control unit of the jug has certain practical advantages as compared with earlier proposals, particularly as regards the extent to which it is necessary to adapt an existing control unit for use with a so-called cordless jug. Thus, a resiliently biased operating member of the disabling mechanism may conveniently be so adapted and arranged to co-operate with a set of switch contacts already provided in an existing general type of control unit, i.e. not one specifically designed for use with a cordless jug, without the need substantially to alter the control unit concerned.

20 The switch contacts associated with the disabling mechanism might thus be those which are also responsive to operation of the thermally-sensitive actuating means for disabling the heater in the event of the element overheating e.g. after having been switched on with insufficient water in the jug to cover the element. Alternatively a further set of contacts of the switch means might be associated with the disabling means, for example a set also forming part of an emergency back-up protector switch and/or forming part of a steam-sensitive switch intended, in certain applications of the control to disable the heater upon liquid in an associated container boiling. The set of contacts

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associated with disabling mechanism might also be a set solely provided for that purpose. In all cases, the operating member of the disabling mechanism may conveniently comprise a push rod
5 carried by a body portion of the control unit and engaged with a leaf spring carrying a movable contact of the set concerned so that the contacts are maintained in an open condition when the jug is detached from its base unit.

10 In known control configurations it is usual for the switch contacts thereof to be broken in response to substantially horizontal movement of an actuating member, and the leaf springs carrying the contacts are therefore traditionally vertically
15 arranged. It is therefore preferred that the operating member of the disabling mechanism is displaceable in a horizontal direction to open and close the contacts. It is however also preferred that the actuating element of the disabling mechanism which
20 co-operates with part of the base unit or with the female socket connector thereof is displaceable in a vertical direction when the jug is engaged with the base unit, and therefore in a preferred embodiment the actuating element is coupled to
25 the operating member by means of a mechanical link means which translates vertical displacements of the actuating element into horizontal movements of the operating member.

One preferred such link means comprises a
30 pivotal bell-crank lever. In such an embodiment, the actuating element may comprises an elongate, vertically displaceable rod the lower end of which projects downwardly within a recess or shroud in the base of jug which surrounds the free ends of
35 the terminal pins, the rod being arranged to be engaged and displaced upwardly by the socket connector of the base unit when engaged by the pins as the jug is placed thereon. The arrangement of the

actuating element in close proximity to the pins in this way helps to ensure that the heater remains isolated from the terminal pins unless and until the jug is properly engaged with the base unit.

- 5 In a preferred such embodiment wherein the actuating element is displaceable in a vertical direction, the resilient means for urging the operating member into its first position when the jug is detached from its base unit may conveniently comprise a
10 spring, preferably a compression spring, arranged to urge the actuating element downwardly.

- As discussed above, the actuating element may be effective to relax the force of the resilient means acting on the operating member so as to permit
15 the member to move to the second position and close the contacts; such movement is preferably caused by the resilient force of a leaf spring mounting a movable contact associated with the operating member, such leaf spring acting to close the contacts,
20 although the operating member may alternatively be coupled to the actuating element in such a way that movement of the actuating member is itself effective to move the operating member, independently of the restoring force of the leaf spring. In
25 either case it is desirable that the contacts are opened and closed quickly to avoid the possibility arcing therebetween.

- In a further preferred embodiment the resilient means is therefore arranged for snap-action between
30 a first condition wherein it acts on the operating member to hold the member in its first position and a second condition wherein the operating member is moved to its second position. In one such embodiment the resilient means comprises a moving pivot overcentre
35 spring mechanism, having an overcentre lever normally biased into a first stable position by means of an overcentre spring, such lever being coupled to the operating member so as to hold the member

in its first position when the lever is in its first stable position. The lever is pivotally mounted to a movable member coupled to said actuating element, whereby upon movement of said actuating
5 element consequent upon the jug being mounted to its base unit the pivotal mounting point of the lever is moved until it reaches a dead-centre position with respect to the overcentre spring whereupon the lever is moved by snap-action to a second,
10 semi-stable position in which the operating member is permitted to move to its second condition. By "semi-stable" is meant that the overcentre lever is only biased into its second position so long as the actuating element holds the lever pivot
15 point beyond the dead-centre position with respect to the overcentre spring. Thus, when the jug is removed from its based unit, the force of the overcentre spring is effective to urge the lever pivot point to back its original position, whereby the lever
20 returns to its first position by snap-action as soon as the dead-centre condition is reached.

In a preferred such embodiment the movable member to which the overcentre lever is mounted forms part of a pivotal bell crank lever associated
25 with a vertically displaceable actuating element, the bell crank lever being arranged so that the pivot point of the overcentre lever is movable in a generally horizontal direction whereby the lever may be readily coupled to a horizontally
30 displaceable operating member such as a push rod acting on the switch contacts, which is advantageous as discussed above.

It will be appreciated that the provision of a snap-acting resilient means is advantageous
35 in that rapid opening and closing of the contacts is achieved, regardless of how quickly a user engages or disengages the jug to or from its base unit, thus minimising the possibility of arcing occurring

between the contacts in the event of the user engaging the jug with its base unit with the socket connector connected to the mains.

5 In a preferred embodiment the thermally-sensitive control unit also comprises terminal pins for the making of electrical connections, via the switch means, with the heater. Since in known control units it is traditional for the terminal pins to extend horizontally, in a preferred embodiment of the invention
10 the terminal pin connector of the jug includes downwardly projecting pin members arranged for engagement with the socket connector of the base unit, such pin members being connected at right angles to respective horizontally extending pins of the the
15 control unit by means of conductive clip members.

This further improves the adaptability of a jug in accordance with the invention for use with a thermally-sensitive control unit of a known general type. In a preferred embodiment the control unit
20 incorporates a set of switch contacts arranged for engagement by a horizontally slidable push rod which previously was coupled to an actuating mechanism responsive to water in an associated container boiling. In one embodiment a jug in accordance with the invention
25 the steam-sensitive switch forms part of a separate control unit, and the said push rod thus constitutes the operating member of the preferred disabling mechanism as discussed above, and the operative parts of the existing control unit need not be substantially altered for use
30 in a jug in accordance with the invention.

Certain embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a partly schematic side view, partly in cross section, of a hot water jug in accordance with the invention;

Figure 2 is a cross-sectional view on an enlarged scale illustrating the internal components of the control unit;

Figure 3 is an end elevation illustrating part of the control unit and bell crank lever of the heater disabling mechanism;

Figure 4 illustrates schematically the disabling mechanism in the condition wherein the heater is enabled; and

Figures 5a to 5d illustrate schematically alternative forms of disabling mechanism;

Referring firstly to Figure 1, a hot water jug 100 formed of suitable plastics material includes an electric immersion heater 101. A thermally-sensitive control unit 1 is mounted to the head 2 of the immersion heater, as will be described in more detail below. The base of the jug is provided to one side thereof with a terminal pin connector 102 including vertically orientated pin members 103 located in a recess or shroud 104 engagable over a complementary female socket connector forming part of a base unit (not shown) for the jug, so that when the jug is engaged with the base unit electrical power may be supplied to the heater via the pin members 103 and via switch means of the thermally-sensitive control, as described in more detail below.

As is usual in a jug of this sort a manually operable switch 105 co-operates with a steam-sensitive control (not shown) arranged to disable the heater when liquid in the jug boils. The switch 105 is wired in series with the heater by means of an electrical lead 106.

As shown in Figure 1, the thermally-sensitive control unit 1 is mounted to the head 2 of the

electric immersion heater, the control unit and heater head being interconnected by means of bolts (not shown) and thus being clamped within an aperture formed in the wall 3 of the hot water jug. The general configuration of the heater will be well known to those skilled in the art, and as is conventional the heater includes a heating element terminating in a pair of cold leads 4 which extend through the plate-like head 2 and having a so-called hot return part which is brazed to the head in good thermal contact therewith. A resilient annular sealing ring 6 is tightly engaged between the head and the control unit so as to provide a water-tight seal with the container wall 3.

The control unit includes first and second body portions 7,8 which interengage axially and are so shaped to define cavities therebetween within which electrical switch means of the control unit are mounted. The second body portion 8 mounts three horizontally extending terminal pins 9 arranged in a triangular configuration and connected to the pin members 103 by means of conductive clips 107. The live and neutral ones of the terminal pins 9 are connected via electrical switch means to the respective cold leads 4 of the element, the free end portions of which extend through apertures 10 formed in the first body portion 7 of the control unit.

Those skilled in this art will be familiar with the basic components of the illustrated control unit and will recognise that the general layout could be varied.

The control unit illustrated in Figure 1 further comprises a primary overheat protector including a snap-acting bimetallic actuator 11 mounted in good thermal contact with a dimple 12 formed in the head adjacent the hot return 5 of the element. The actuator 11 is of a known type and includes a central tongue 13 which is secured to the first body portion 7 of the control by means such as a hammer drive screw, and an

upper peripheral portion 14. The upper portion 14 is arranged for engagement with an axially slidable push rod (not shown) extending through an aperture in the first body portion 7 and co-operating with a set of switch contacts (not shown) wired in series between either the live or neutral terminal pin 9 and a respective cold lead 4. The actuator 11 is calibrated with a nominal operating temperature so as to undergo snap action when the element overheats, for example having been switched on with insufficient water in the container to cover the element or in the event that the container boils dry. Upon operation of the actuator 11 it reverses its curvature from the configuration shown in Figure 1 and the upper peripheral portion 14 thereof is moved rightwardly ie, away from the heater head, so as to engage the push-rod which in turn opens the switch contacts so as to interrupt the power supply to the element. This general arrangement of primary protector is well known.

The control unit illustrated in Figure 1 further comprises a second set of switch contacts 15 arranged in series between the other cold lead 4 of the element and a respective terminal pin 9. The contacts 15 include contact members 16 carried by conductive leaf spring elements 17, 18, one of which 17 is connected to the base portion of the respective terminal pin 9 and the other of which 18 is connected via a further conductive strip element to the respective cold lead 4. Such a contact arrangement is of the same general type as described in U.K. Patent Specification No. 2170956, but other similar configurations are possible.

The illustrated control unit further comprises a pre-loaded spring mechanism associated with the second set of contacts 15 which is arranged to provide back-up protection in the event that the bimetallic actuator 11 should fail. One form of spring mechanism is shown in more detail in Figure 2, from which it will be seen that

the mechanism comprises a coil spring 25 which is mounted within a recess 26 formed in the second body portion 8 and which in normal use is held under compression by means of a retaining element in the form of a push-rod 27. Push-rod 27 is formed for example from nylon and extends through and is axially moveable within a bore 28 formed in the first body portion 7. Thus, when the control unit is clamped to the heater head, the push-rod 27 engages the head and is urged rightwardly relative to the control unit so that the spring 25 is placed under compression.

The spring 25 includes an operating member in the form of an arm 30 formed integrally therewith which extends laterally and which is arranged for engagement with the leaf spring 18 adjacent the free end portion 22 thereof. However, as shown in Figure 2 in normal use when the spring is pre-loaded by means of the push-rod 27, the operating member 30 of the spring is spaced axially from the leaf spring 18 so that normally the contacts 15 are free to open and close in response to operation of the lever member 21 forming part of the steam-sensitive over-centre spring mechanism.

However, in event of failure of the actuator 11, the arrangement is such that the consequent overheating of the head causes the end of the push-rod 27 which engages the head to soften and deform under the force of the spring whereby the spring is released sufficiently to enable the operating arm 30 to engage the leaf spring 18 and open the contacts.

The heater is thus disabled, and since the contacts 15 are open under the positive action of the coil spring 25 the possibility of subsequent reclosing of the contacts as a result for example of distortion of part of the control caused by over-shoot heating is avoided.

As shown in the drawings the jug also includes a heater disabling mechanism associated with the second set of contacts 15 of the control unit. In a known prior art arrangement, such contacts 15 were associated with a steam-sensitive actuating mechanism. This is not required in the illustrated arrangement which instead includes a separate steam-sensitive control associated with switch 105 as described above.

The heater disabling mechanism includes an operating member in the form of slidable push rod 110 arranged for engagement with the second set of contacts 15. The mechanism further includes a vertically orientated actuating element or rod 111 which co-operates with the push rod 110 via a pivotal bell crank lever 112 which translates vertical movement of the rod 111 into horizontal movement of the push rod 110. The bell crank lever 112 is pivotally mounted to arms 113 secured either to the control unit or to the jug, as shown in Figure 3.

The actuating rod 111 includes a flange 114 which co-operates with the bell crank lever 112, and a coil spring 115 is arranged normally to urge the actuating rod 111 downwardly to the position shown in Figure 1. In this position, the lower arm of the bell crank lever 112 engages the push rod 110 and urges it leftwardly from the position shown in Figure 2 into a first position wherein the other end of the push rod engages the free end 22 of leaf spring 18 of the contact set 22

so as to break the contacts and isolate the heater from the respective terminal pin 9.

As shown in Figure 1, the lower end of the actuating rod 111 extends slidably through the top of the shroud 114 so as to project into the shroud in the proximity of the pin members 103. Thus, as shown in Figure 4, when the jug is engaged with its corresponding base unit the actuating rod 111 is engaged by the front end of the female socket connector 120 (shown in broken lines) forming part of the base unit, so that the rod is displaced upwardly against the spring biasing force. This permits the push rod 110 to move under the restoring force of the leaf spring 18 to its second position as shown in Figure 2 wherein the contact set 22 is closed and power can be supplied to the heater. The heater is therefore not energised until electrical connection has been made between the pin members 103 and the corresponding female socket connector, and the problem of arcing therebetween is therefore avoided.

It is self-evident from the drawings that the control unit 1 has not been substantially modified for use with the illustrated jug having a heater disabling mechanism. The clips 107 which connect the respective pin members 103 to the horizontal pins 9 of the control unit are preferably friction fit clips which are simply engaged over the pins 9. The moulded plastic shroud 104 which surrounds the pin members 103 preferably includes apertures 121 within which the pin members 103 are loosely mounted before being engaged with the respective pins 9 by means of the clips 107.

In the illustrated control the push rod 110 is arranged for engagement with the free end part 22 of the leaf spring 18 carrying a movable contact of the contact set 15 which is also acted on by the pre-loaded spring mechanism in the event of

serious over-heating. It will however be appreciated that the push rod 110 might instead be arranged for engagement with the set of switch contacts (not shown) associated with the bimetallic actuator

5 11.

An alternative form of heater disabler mechanism is illustrated in Figures 5a to 5d. These figures show the control unit 1 schematically, and such unit may be substantially identical to the unit 10 illustrated in Figure 2. Like reference numerals are used in Figures 5a to 5d to identify parts which may be similar to the parts shown in Figures 1 to 4.

The arrangement shown in Figures 5a to 5d 15 again includes a vertically orientated actuating member in the form of rod 111 which is coupled to the push rod 110 via a bell crank lever 150. However in this embodiment the bell crank lever 150 is coupled to the push rod 110 via an overcentre 20 spring mechanism comprising a pivotally mounted spring 151 and an overcentre lever 152 pivotally mounted at its lower end to the bell crank lever 150 and freely engaging at its top end a stop 153 formed on a horizontally slidable element 154 the 25 front end of which is arranged for engagement with the push rod 110. The spring 151 may comprise a leaf spring, or alternatively may take the form of a wire spring in a Z or sigma shaped configuration (the spring being shown side on in Figure 5a).

30 As shown in Figure 5a when the jug is not engaged with the corresponding base unit the spring 151 acts to urge the top end of the overcentre lever 152 against the stop 153 and thus urges the member 154 against the push rod 110 so as to maintain 35 the contacts in an open condition. When the jug is engaged with a base unit the actuating element 110 pivots the horizontal arm of the bell crank lever 150 upwardly which in turn causes the lower

end of the vertical arm of the lever to pivot in the direction of the arrow in Figure 5a. This in turn causes the pivot point P1 about which the overcentre lever 152 is mounted to the bell crank lever 150 to move rightwardly as shown in Figure 5a. Until such time as this pivot point P1 is aligned with the pivot points P2 and P3 about which the overcentre spring 151 is respectively mounted to the upper wall of the shroud and the top of the overcentre lever the spring 151 still urges the upper part of the overcentre lever 152 against the stop 153 so that member 154 maintains the push rod 110 in a position wherein the contacts 15 are open. However, once the pivot points P1, P2 and P3 are aligned, which corresponds to an unstable dead centre position of the overcentre spring mechanism, the mechanism undergoes snap action to the position shown in Figure 5b wherein the overcentre lever is biased into a semi-stable condition which permits movement of the member 154 and the push rod 110 under the force of the leaf spring carrying the movable contact of the contact set 15 so that the contacts are closed. The disabling mechanism thus operates by snap action, and the contacts 15 are closed rapidly, avoiding the problem of arcing, regardless of the speed of engagement of the jug with its base unit.

The condition of the overcentre mechanism shown in Figure 5b is a semi-stable position insofar as once the actuating element 111 is lowered by virtue of the jug being disengaged from its base unit, the spring 151 acts to urge the lower end of the vertical arm of the bell crank lever leftwardly from the position shown in Figure 5b and once the pivot points P1, P2, P3 are aligned the spring operates by reverse snap action so that the overcentre lever 152 urges the member 154 leftwardly which in turn engages the push rod 110 and reopens the

contacts. Again this snap action ensures rapid opening of the contacts, regardless of the speed of disengagement.

The embodiment shown in Figures 5a and 5b also differs from that shown in the first embodiment insofar as the separate steam sensitive switch 105 is replaced by an actuating lever 160 coupled via a further overcentre spring mechanism (not shown) to a bimetallic actuator exposed to steam resulting from liquid within the container boiling. Such lever is also coupled to a manually operable on/off switch of the jug. Thus, the lever 160 is movable to a position shown in Figures 5c and 5d wherein the contacts 15 are maintained open, regardless of the condition of the overcentre mechanism of the heater disabling mechanism described above. The lever 160 engages in an aperture formed in the slidable member 154, and as shown in Figure 5d when the lever 160 is in its off position, the member 154 maintains the push rod 110 opening the contacts even when the overcentre mechanism of the disabling mechanism is tripped since the top end of the overcentre lever 152 is free to move rightwardly away from the stop 153 provided on the slidable member 154.

As shown in Figure 5a, when the overcentre spring mechanism of the heater disabling mechanism is in its off position by virtue of the jug being disengaged from its base unit, movement of the lever 160 by an operator in an attempt to connect the heater to the pin connector is ineffective by virtue of a sliding connection between the lever 160 and the slidable member 154. Thus the lever 160 can move rightwardly with respect to the member 154 and an attempt to switch the jug on while disengaged from its base unit will not close the contacts 15 until such time as the actuating member 110 is raised to trip the spring mechanism of the disabling

mechanism consequent upon the jug being engaged
with its base unit. However from the position
shown in Figure 5b, upon boiling of liquid within
the jug, or upon the jug being manually switched
5 off by a user, the consequent leftward movement
of the lever 160 is effective to break the contacts
by virtue of the stop 153 being pulled away from
the overcentre lever 152.

Claims:

1. A hot water jug of the kind described which is adapted to be detachably interengaged with a
5 corresponding base unit therefor whereby terminal pins of an electrical connector arranged in a lower region of the jug are engaged with a female socket connector forming part of the base unit for the supply of electrical power to the heater of the
10 jug, wherein the jug comprises a thermally-sensitive control unit mounted to or adjacent the cold leads of the heater, the control unit comprising electrical switch means with at least one set of switch contacts connected between said terminal pin connector and
15 the heater, such contacts being breakable in response to operation of a thermally-sensitive actuating means mounted in good thermal contact with the heater so as to interrupt the power supply to the heater in the event of the element thereof overheating,
20 the jug further comprising a heater disabling mechanism associated with the same or further set of switch contacts of the switch means of said control unit, such mechanism including an operating member which co-operates with the contacts and which is movable
25 between a first position wherein the contacts are broken so that the heater is isolated from the terminal pin connector and a second position wherein the contacts are closed, there being resilient means acting to maintain the operating member in
30 its first position, and an actuating element arranged to co-operate with the base unit or socket connector thereof when said jug is engaged with the base unit as aforesaid so as to cause or permit movement of the operating member to its second position
35 by overcoming or relaxing the force exerted thereon by the resilient means, whereby the contacts are only closed once electrical contact has been made between the terminal pin connector of the jug and



the socket connector of the base unit.

2. A hot water jug as claimed in claim 1 wherein the operating member comprises a push rod carried by a body portion of the control unit and arranged
5 for engagement with a leaf spring carrying a movable switch contact of a switch contact set so that the contacts are maintained in an open condition when the jug is detached from the base unit.
- 10 3. A hot water jug as claimed in claim 1 or 2 wherein the operating member is displaceable in a generally horizontal direction to open and close the contacts, the actuating element being coupled to the operating member by means of a mechanical
15 link means which translates vertical displacements of the actuating element into horizontal movements of the operating member.
4. A hot water jug as claimed in claim 3 wherein the link means comprises a pivotal bell-crank lever.
- 20 5. A hot water jug as claimed in claim 4 wherein the actuating element comprises a vertically displaceable rod the lower end of which projects downwardly within a recess or shroud in the base of jug which surrounds the free ends of the terminal pins, the
25 rod being arranged to be engaged and displaced upwardly by the socket connector of the base unit when engaged by the pins as the jug is placed thereon.
6. A hot water jug as claimed in claim 5 wherein the resilient means comprises a compression spring
30 arranged to urge the actuating element downwardly.
7. A hot water jug as claimed in any of claims 1 to 5 wherein the resilient means is arranged for snap-action between a first condition wherein it acts on the operating member to hold the member
35 in its first position and a second condition wherein the operating member is moved to its second position.
8. A hot water jug as claimed in claim 7 wherein the resilient means comprises a moving pivot overcentre



- spring mechanism, having an overcentre lever normally biased into a first stable position by means of an overcentre spring, such lever being coupled to the operating member so as to hold the member
- 5 in its first position when the lever is in its first stable position the lever being pivotally mounted to a movable member coupled to said actuating element, whereby upon movement of said actuating element consequent upon the jug being mounted to
- 10 its base unit the pivotal mounting point of the lever is moved until it reaches a dead-centre position with respect to the overcentre spring whereupon the lever is moved by snap-action to a second, semi-stable position in which the operating member
- 15 is permitted to move to its second condition.
9. A hot water jug as claimed in claims 5 and 8 wherein the movable member to which the overcentre lever is mounted forms part of a pivotal bell crank lever associated with a vertically displaceable
- 20 actuating element, the bell crank lever being arranged so that the pivot point of the overcentre lever is movable in a generally horizontal direction whereby the lever may be readily coupled to a horizontally displaceable operating member.
- 25 10. A hot water jug as claimed in any preceding claim wherein the control unit comprises horizontally extending terminal pins which are electrically connected, via the switch means, to the heater, the said electrical connector of the jug including
- 30 downwardly extending terminal pins which are connected generally at right angles to respective ones of the horizontally extending pins by means of conductive clip members.
11. A hot water jug substantially as herein described
- 35 with reference to the accompanying drawings.

