May 13, 1969 A. TYLER 3,444,355

ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

Filed July 5, 1966 Sheet 1 of 5

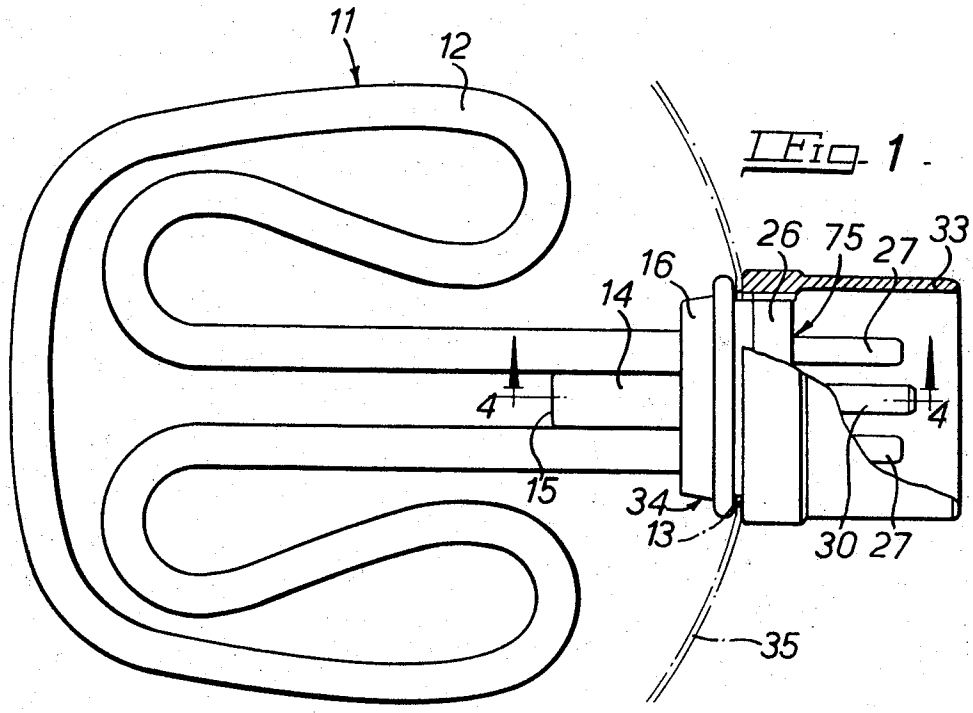

Fig. 1.

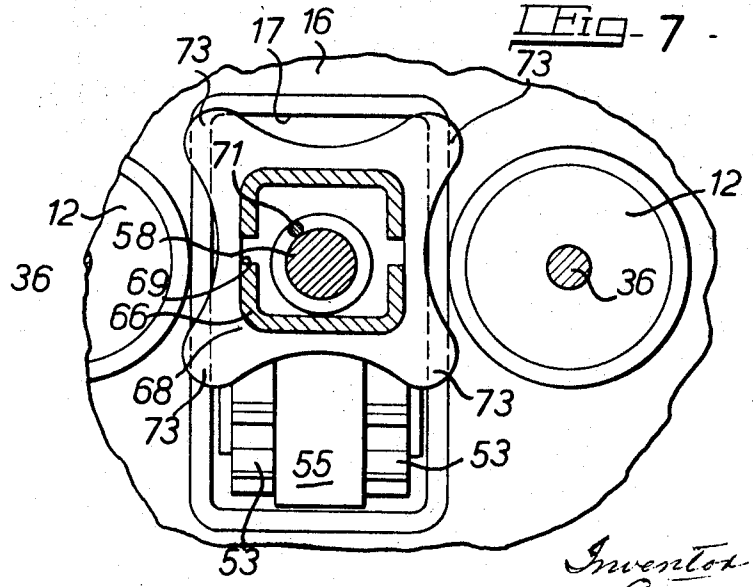

Fig. 7.

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ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

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Fig. 3

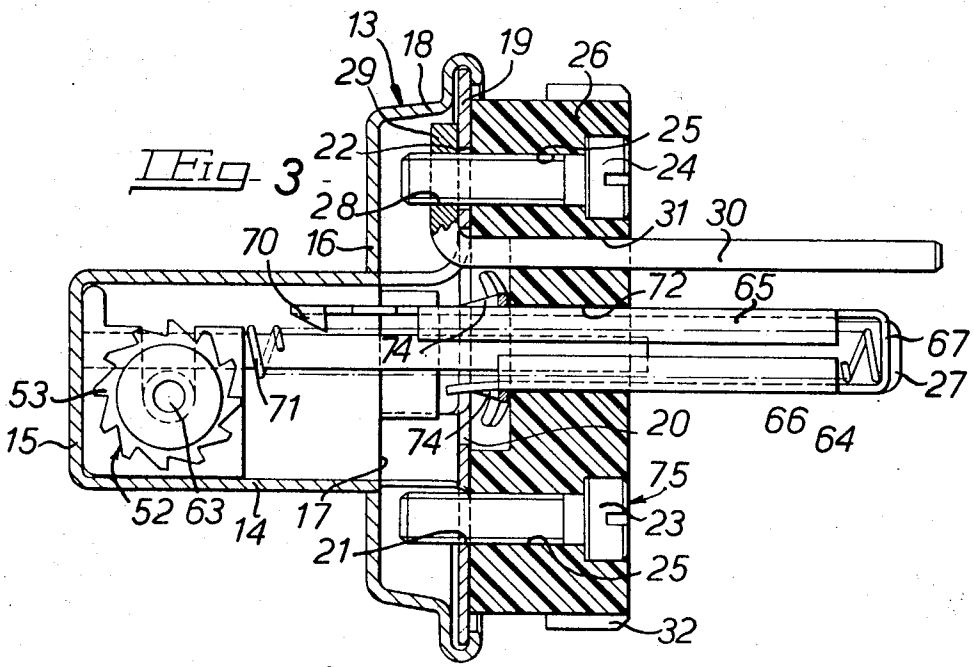
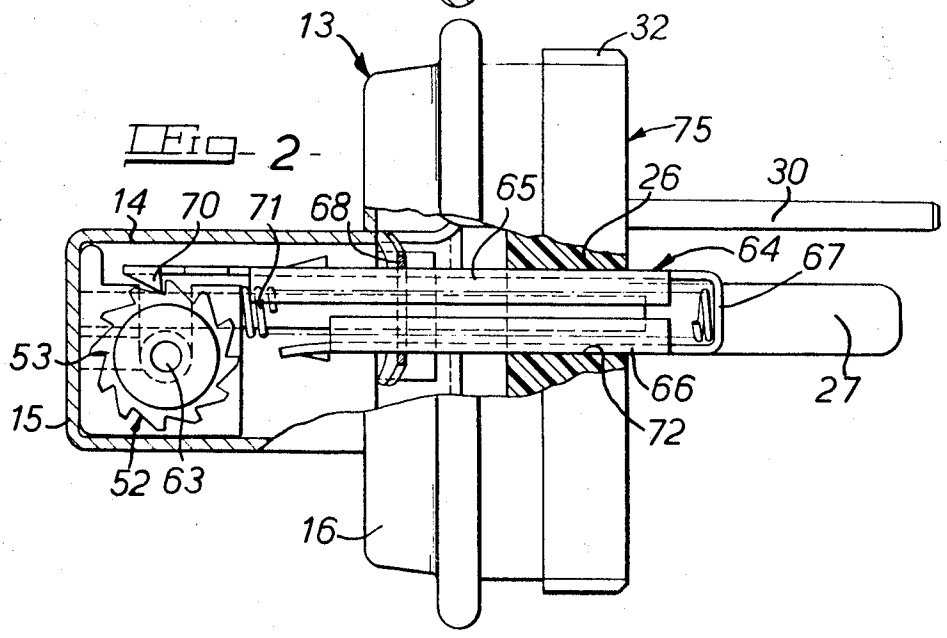


Fig. 2



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ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

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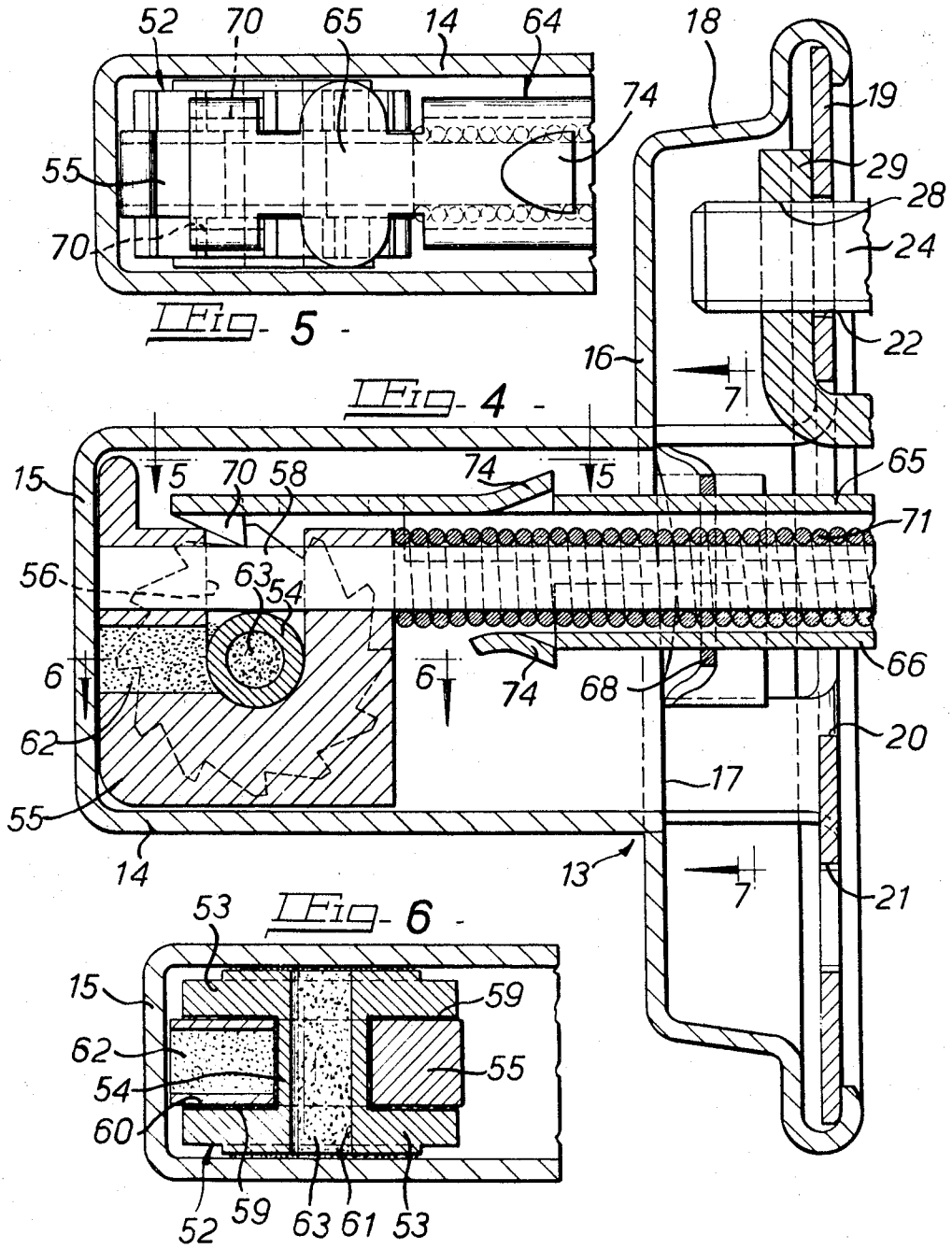

Fig. 5

Fig. 4

Fig. 6

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ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

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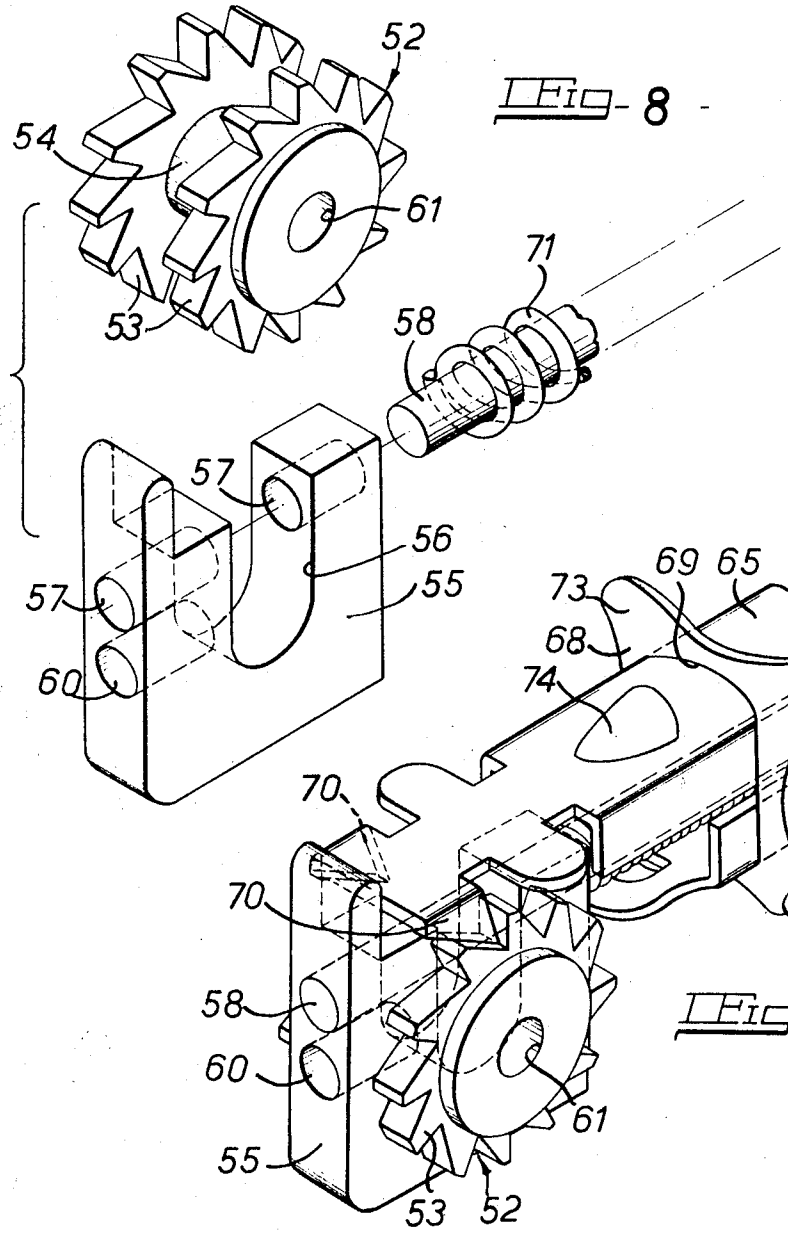

Fig. 8

Fig. 9

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ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

Filed July 5, 1966 Sheet 5 of 5

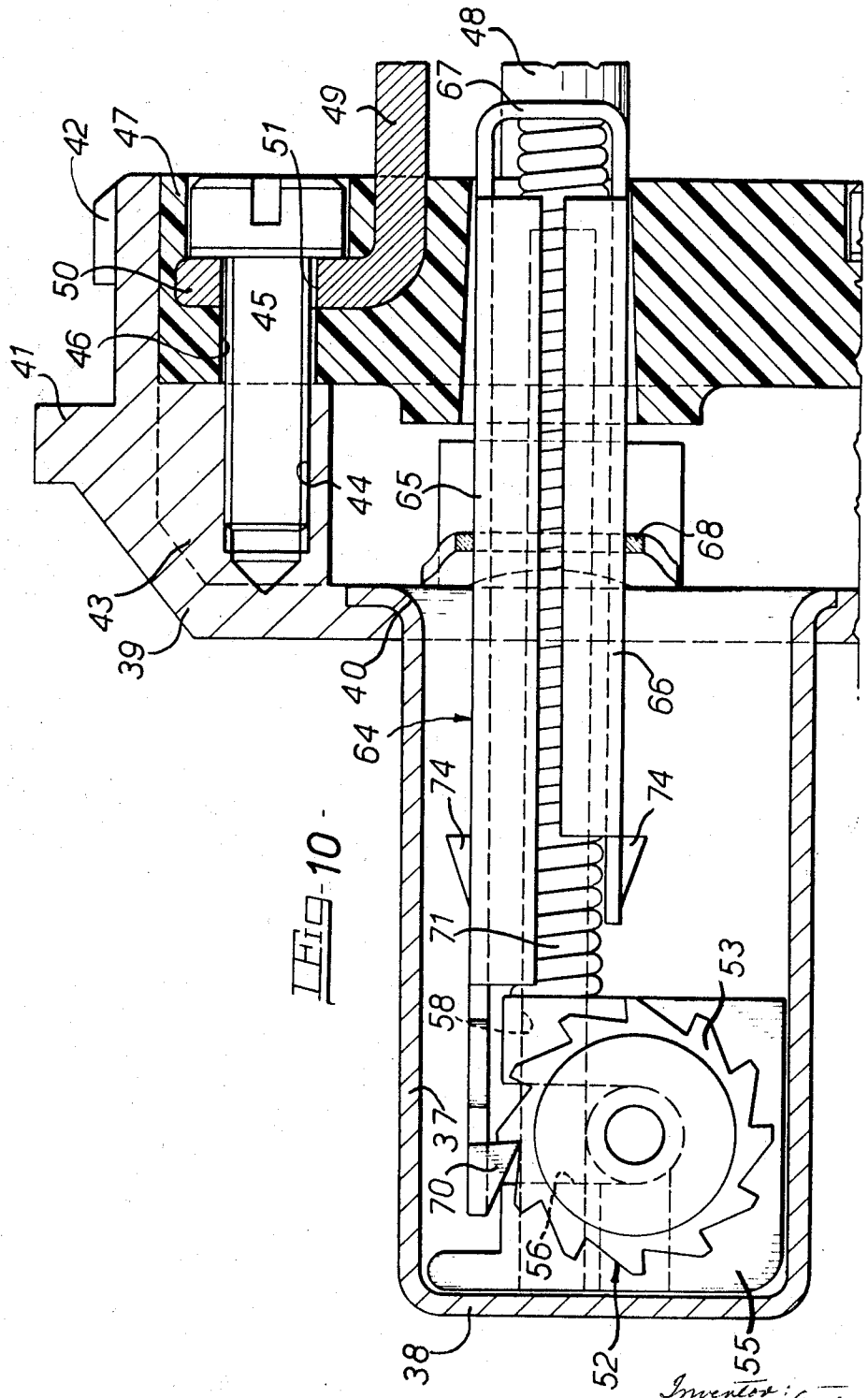

FIG-10-

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United States Patent Office

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Patented May 13, 1969

3,444,355

ELECTRICALLY HEATED APPLIANCES HAVING THERMAL CUT-OUTS

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Filed July 5, 1966, Ser. No. 562,766

Claims priority, application Great Britain, July 6, 1965, 28,489/65, 28,490/65, 28,491/65; Nov. 23, 1965, 49,798/65

Int. Cl. H01h *37/76, 71/20;* H05b *1/02*

U.S. Cl. 219—331 11 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed hereinafter a new thermally operated electrical cut-off device for use as a safety device with appliances employing electrical heaters. The device comprises at least two axially spaced ratchet wheels joined by a journal to form a ratchet cluster. The ratchets are engaged by pawls forming part of a plunger member where the plunger member is movable between an operative position and an inoperative position. The journal is mounted in a spacer member and both the journal and spacer may be provided with holes for receiving fusible material. The fusible material, when in a solid state, is used to fix the ratchet cluster and spacer to each other and to a thermal housing and when in a melted or liquid state permits the ratchets to rotate. The cluster, spacer and plunger are so constructed that they may be removed as a unit from the housing.

This invention relates to electrical appliances having electrical resistance heating elements such as kettles, coffee percolators, urns, water heaters, hot water storage tanks, washing boilers, washing machines, electric irons and space heaters.

The term "electrically heated appliance" as used in this specification, where the context so admits, is to be understood as including any of these and like electrically heated appliances.

The invention relates to such appliances in which the electrical heating circuit includes a thermally operative cut-out device for preventing over-heating of the heating element comprising a spring-loaded plunger normally anchored to a fixed part by the engagement of a pawl on the plunger with a ratchet which is secured and prevented from rotation by fusible metal. On over-heating the fusible metal melts allowing the ratchet to turn and releasing the spring-loaded plunger to operate means for breaking the electrical circuit to the heater. Such cut-out devices are hereinafter referred to as "the kind described."

The heating element is often connected to the electric supply through an inlet plug and socket coupling, the inlet plug of which is connected to the supply lead. The spring-loaded plunger of the thermal cut-out is then usually arranged to eject the inlet plug from the appliance and so break the heater circuit.

It sometimes happens that after prolonged use or for other reasons the fusible metal fails to hold the ratchet and the thermal cut-out operates without over-heating. This in itself might often be merely a minor irritant to the user but as there has been no over-heating the usual self re-securing of the ratchet by the solidification of the fusible metal as the appliance cools does not occur and

the user is unable to re-set the thermal cut-out with the result that the appliance cannot be used.

The present invention consists in a thermally operative cut-out device of the kind described comprising a ratchet assembly including two or more ratchets arranged in axial alignment, each secured by fusible metal to a fixed part and each engaged by an associated pawl on or coupled to a common plunger.

The ratchets may be secured by the fusible metal at a journal connection and/or at a face contact between one or both faces of each ratchet and a part or parts non-rotatably mounted about the ratchet axis. The ratchets are preferably separated by a spacer or spacers which are non-rotatably mounted about the ratchet axis and to which the ratchets are secured by fusible metal between the adjacent faces of the ratchets and the spacer or spacers. Alternatively or in addition the outer faces of the ratchets may be embraced by a U-shaped member, for example of sheet metal, to which the ratchets are secured by fusible metal between outer faces of the ratchets and the inner faces of the limbs of the U-shaped member which is non-rotatably mounted about the ratchet axis.

Preferably the ratchet assembly comprises a bobbin-shaped ratchet cluster having a ratchet at each end joined by a short journal portion. The ratchet cluster is conveniently made in one piece, for example by machining from the solid. By manufacturing the ratchet cluster in one piece the alignment of the ratchet teeth and their simultaneous engagement with their respective pawls on the plunger is ensured.

The ratchets and spacer or spacers may be detachable from the other fixed parts of the cut-out device as a unitary assembly removable from a housing of the cut-out device.

On fitting the ratchet assembly a slug of fusible metal may be inserted in a bore on the ratchet axis through the assembly and open at the outer faces of the ratchets. Additionally if a spacer or spacers are provided between the ratchets, fusible metal may be applied so as to run around the inner faces of the ratchets securing them to the spacer or spacers. Where the ratchet assembly comprises a ratchet cluster, as preferred, a hole may be provided in the spacer or in each spacer, which hole, when the ratchet cluster is fitted, is radial to the journal port on and into which a fusible metal slug is inserted. Upon the first thermal operation of the cut-out device, usually for test purposes before leaving the factory, the or each slug of fusible metal melts and flows over the adjacent surfaces of the ratchet assembly and housing. This provides a supply of fusible metal to ensure self re-securing of the ratchets on re-solidification of the fusible metal and also joins the ratchet assembly to the housing so providing good thermal contact between them.

The cut-out device may be provided in an electrical heater having a terminal head comprising a hollow sheet metal pressing through the walls of which the ends of the heating resistance are brought into a cavity of the terminal head for connection to supply terminals or contact pins of an inlet socket, which cavity is formed at least in part by the interior of the pressing, the edges of the pressing being spun or pressed over the periphery of a laterally directed, circumferentially continuous marginal portion of a member forming or supporting a base on which are mounted the contact pins of an inlet socket or terminals for direct connection of a supply lead.

The member may be a metal plate 4 of disc or annu-

lar shape to which a base of insulating material is secured. Alternatively the member may be a radially directed flange forming part of a base moulded in plastics material. In each case the base may be externally screw-threaded for a retaining ring for securing the terminal head in an opening through the wall of an appliance or for a contact pin protective sleeve, or terminal cover which may also serve to secure the terminal head. The retaining ring, protective sleeve or terminal cover may also be plastics material.

A housing for the cut-out device may conveniently extend inwards from the terminal head of the heater. Preferably the housing has an aperture at the head through which the ratchet assembly can pass. The aperture may normally be covered by the base of the terminal head on which are mounted the contact pins or terminals.

The housing may be a deep drawn sheet metal pressing joined to or itself forming at the outer end a portion which constitutes the terminal head pressing and enlarges to a mouth which receives and is spun over the edge of a plate to which the terminal or contact pin base is secured.

Instead of being enlarged or having a sheet-metal mouth portion, the sheet metal housing may be brazed or otherwise secured to a plate or stamping which is included in the terminal head and has an opening corresponding to, and in register with the mouth of the housing. The ends of the heating element are also secured to the same side of the plate or stamping as the housing. The terminal or contact pin base is secured to the other side of the plate or stamping by screws engaging tapped holes in the plate or stamping.

The housing may have uniform, non-circular, internal cross-section to suit the cross-sectional outline of the ratchet assembly. The ratchet assembly can then readily be slid into correct position at the inner end of the housing where it is retained.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which,

FIGURE 1 is a plan view of an electrical heater fitted with a cut-out device in accordance with the present invention,

FIGURE 2 is an enlarged side view of the cut-out device in its normal, inoperative, condition with a housing of the device shown partly broken away,

FIGURE 3 is an enlarged side view of the cut-out device in its operaive condition and showing the housing in section,

FIGURE 4 is an enlarged fragmentary section through the cut-out device and housing taken on the line 4—4 of FIGURE 1 and showing the cut-out device in its inoperative condition,

FIGURES 5, 6 and 7 are respectively fragmentary sections on the lines 5—5, 6—6 and 7—7 of FIGURE 4.

FIGURE 8 is an enlarged exploded perspective view of a ratchet assembly of the cut-out device,

FIGURE 9 is an enlarged perspective view of the ratchet assembly and associated pawls, and

FIGURE 10 is an enlarged fragmentary vertical section showing a modified housing of the cut-out device.

A thermally operative cut-out device in accordance with the present invention is applied in this embodiment to an immersion heater **11**, as shown in FIGURE 1, for a domestic kettle. The heater **11** has an element **12** of the tubular sheathed type and a housing **13** which, as shown in FIGURES 2, 3 and 4, has a sheet metal part **14** of substantially uniform rectangular cross-section with a closed inner end **15**, and a sheet metal circular cross-section part **16** which constitutes a terminal head and is joined to an outer, open, end **17** of the rectangular part **15**. The circular part **16** of the housing **13** has a peripheral skirt **18** which at its edge is spun over the periphery of an annular plate **19** having a central opening **20** larger than the cross-section of the rectangular part **15** of the housing. The annular plate **19** is spaced from the inner wall of the circular part **16** so that a cavity is defined between them. Around the opening **20** at opposite ends of a diameter the plate **19** has two holes **21** and **22**, one hole **21** of which is tapped and the other hole **22** is plain. These holes **21** and **22** receive securing screws **23** and **24** passed through passages **25** in an insulating base **26** of plastics material on which are mounted tubular contact pins **27** of an inlet socket **75** and which is secured to the plate **19** by the screws **21** and **22**. The one screw **23** screws into the tapped hole **21** of the plate **19** and the other screw **24** passes through the plain hole **22** of the plate **19** and engages a tapped hole **28** in an angled foot **29** of an earthing pin **30**. The main part of the earthing pin **30** extends from the foot **29** through the opening **20** in the plate **19** and through a hole **31** in the insulating base **26**. The insulating base **26** has an external screw-thread **32** around its rim to receive a protective sleeve **33**, FIGURE 1, which secures the immersion heater **11** in an opening **34** through a wall **35** of the kettle and surrounds the projecting contact pins **27** and earthing pin **30**. The ends of the tubular sheath of the element **12** are brought through the inner wall of the circular part **16** of the housing into the cavity defined between the annular plate **19** and the inner wall of the circular part, as shown in FIGURES 1 and 7, and are brazed or welded to the inner wall. Leads **36**, FIGURE 7, extends into the bores of the tubular contact pins **27** to connect the ends of the resistance wire of the element **12** to the contact pins.

A modified form of housing which may be provided instead of the housing **13** just described is shown in FIGURE 10. This housing has, as before, a sheet metal part **37** of substantially uniform rectangular cross-section with a closed inner end **38**, and a metal cup-shaped part **39** which is a hot brass stamping and constitutes a terminal head and is joined to an outer, open, end **40** of the rectangular part **37**. The cup-shaped part **39** has an external annular flange **41** and an external screw thread **42** around its rim. The immersion heater is fitted, as before, in an opening through a wall of the kettle with the flange **41** of the cup-shaped part **39** abutting against the inner surface of the kettle wall around the opening, and the heater is secured in place by a protective sleeve of the form shown in FIGURE 1 which is screwed onto the external screw thread **42** and tightened against the outer surface of the kettle wall. On the inside of the cylindrical portion of the cup-shaped part **39** extending from its circular base portion are two diametrically opposed ribs **43**, only one of which is shown in FIGURE 10, each having a screw-threaded bore **44** to receive a screw **45** passed through a hole **46** in an insulating base **47** of plastics material which is inserted into the mouth of the cup-shaped part **39** and in which are moulded metal contact pins **48**. Also moulded into the insulating base **47** adjacent one of the holes **46** is an earthing pin **49** having an angled foot **50** in which is a plain aperture **51** coaxial with and of the same diameter as the hole **46**, through which aperture **51** the screw **45** in that hole **46** also passes.

In the housing **13** is provided a ratchet assembly which comprises a bobbin-shaped ratchet cluster **52**, as clearly shown in FIGURES 8 and 9, which has a ratchet **53** at each end joined by a short journal portion **54**. The ratchet cluster **52** is made in one piece by machining from the solid metal. A rectangular metal spacer block **55** having a thickness equal to the spacing between the ratchets **53** of the ratchet cluster **52** is formed with a U-shaped slot **56** to admit the journal portion **54** of the cluster. A longitudinal hole **57** in the block **55**, FIGURE 8, traverses both limbs of the U near their upper ends and receives a plunger guide pin **58** which extends in one direction from the block **55**.

On assembly the ratchet cluster **52** is dropped into the slot **56** and the guide pin **58** is inserted through the longitudinal hole **57**. The guide pin **58** retains the ratchet clus-

ter 52 which is a free running fit as initially assembled. Fusible metal is then applied to the journal portion 54 and runs around the journal and the inner faces of the ratcets 53 securing them to the block, as indicated exaggeratedly for the purposes of illustration in FIGURE 6 at 59.

In the block 55 there is a hole 60, FIGURES 8 and 9, radial to the rounded end of the U-shaped slot 56 and in the ratchet cluster 52 there is an axial bore 61 extending right through the ratchets 53 and journal portion 54. Slugs 62 and 63 of flux-cored fusible metal, FIGURES 4 and 6, are put respectively into the radial hole 60 and the axial bore 61 before the ratchet assembly is inserted in the housing 13.

The ratchet assembly is inserted into the housing 13 by way of the opening 20 in the annular plate 19 and pushed down to the closed inner end 15 of the rectangular part 14 with the guide pin 58 extending parallel to the length of the housing, as shown in FIGURES 2, 3 and 4, towards the outer end of the housing. The ratchet assembly is restrained from turning about the longitudinal axis of the housing 13 by contact between the outer faces of the ratchets 53 and the walls of the rectangular part 14 of the housing. This contact also affords good thermal transfer between the housing and the ratchet assembly so that the cut-out device has a rapid response to overheating.

On the first operation of the cut-out device the fusible-metal slugs 62 and 63 melt and on resolidification secure the outer faces of the ratchets 53 and the end of the block 55 to the adjacent surfaces of the rectangular part 14 of the housing 13, as shown in FIGURE 6, so improving heat transfer.

Mounted on the guide pin 58 is a plunger 64, as shown in FIGURES 2, 3, 4 and 9, made from a length of sheet metal channel section bent back upon itself about transverse axes so that the open sides of the channel of the two confronting portions 65 and 66 are towards one another forming a nearly closed box-section for most of the length of the plunger 64 and an outer end wall 67. A small quadrilateral metal retainer washer 68 bent slightly about one transverse axis and having concave sides, as shown in FIGURES 7 and 9, and a rectangular central opening 69 is fitted around the free ends of the confronting portions 65 and 66 of the plunger 64 to prevent them from separating. The one confronting channel section portion 65 of the plunger 64 is extended beyond the other portion 66 and is arranged to straddle the top of the block 55, as shown in FIGURES 5 and 9. The flanges of the channel of this projecting part of the portion 65 are partly cut away at the inner end along opposite faces of the block 55 and shaped at the ends to form hook-shaped portions 70 to act as pawls to engage the teeth of the ratchets 53. A helical compression spring 71 around the guide pin 58 abuts at the inner end against the block 55 and at the outer end against the outer end wall 67 of the plunger 64. On assembly the plunger 64 is pushed inwards against the spring 71 to engage the pawl portions 70 with the ratchets 53 and the plunger and ratchet assembly form a self-contained unit for insertion into the housing 13. When fitted in position the plunger projects through the opening 20 in the annular plate 19 and through a complementary opening 72 in the insulating base 26, which is fitted in the housing after the plunger and ratchet assembly, and the retainer washer 68, which is wider than the outer end of the rectangular part 15 of the housing 13 but small enough to pass through the opening 20, bears at its corner portions 73 against the circular part 16 adjacent the outer end of the rectangular part, as shown in FIGURE 7. The concave sides of the washer 68 enable it to be fitted between the ends of the tubular sheath of the element 12 where the ends protrude into the housing 13. Normally the outer end of the plunger 64 is flush with or projects only a short way from the outer face of the insulating base 26, as shown in FIGURE 2, so that an inlet plug, not shown, can be engaged with the inlet socket 75. Upon release of the plunger by the ratchets 53 when overheating occurs and the fusible metal melts allowing the ratchets to turn the compression spring 71 projects the plunger outwards to eject the inlet plug. At its maximum projection from the outer face of the insulating base 26, shown in FIGURE 3, when an attempt is made to insert the inlet plug again, the plunger 64 engages the body of the inlet plug before the contact pins 27 and earthing pin 30 of the inlet socket 75 can be engaged with their respective sockets in the inlet plug. The plunger is urged towards this projecting position by the compression spring 71 but is prevented from extending further by the engagement of stops 74 on the plunger, pressed out of the confronting channel portions 65 and 66 near their free ends, with the retaining washer 68 which is moved, as the plunger is urged outwards, into engagement with the inner face of the insulating base, as shown in FIGURE 3. When pressure is exerted on the inlet plug the plunger is pushed inwards against the compression spring 71 to re-engage the pawl portions 70 of the plunger with the teeth of the ratchets 53, which holds the plunger in, provided that the device has cooled down sufficiently for the fusible metal to re-secure the ratchets to the block 55 and to the walls of the rectangular part 15 of the housing 13.

A similar ratchet and plunger assembly is provided in the housing of FIGURE 10 and the parts of the assembly are indicated by the same reference numerals as used with reference to FIGURES 2 to 9.

The ratchet assembly is held in place in the housing 13 by the joint formed by the melting of the slugs 62 and 63 of fusible metal.

The ratchet assembly may be withdrawn through the open outer end of the housing by a suitably shaped tool, for example a two pronged fork with shaped tips to engage behind parts of the ratchet assembly.

The rectangular part 14 of the housing 13 is quite short, as shown in FIGURE 1, and it makes thermal contact on its opposite vertical sides with the adjacent parts of the tubular sheathed element 12 close to the end of the element which are brought into the housing. If desired a medial part of the element 12 may be brought back into thermal contact with the closed inner end 15 of the rectangular part 15 of the housing.

In the form of the invention described above the ratchet assembly by having the ratchet cluster 52 and by securing both the ratchets 53 and journal portion 54 of the cluster in place by fusible metal connections is much less susceptible to failure than fusible metal cut-outs hitherto known. The cut-out can have a small thermal capacity and with the good thermal contact between the housing and the ratchet assembly very rapid response can be achieved.

I claim:

1. A thermally operative cut-out device for breaking the electrical circuit of heating means for electrically heated appliances in the event of over-heating of the heating means, and where the device is of the type comprising: a fixed part; rotatable ratchet wheel means; fusible metal which normally secures the ratchet wheel means against rotation relative to the fixed part and which melts when heated above a pre-determined temperature to allow the ratchet wheel means to rotate; a spring loaded plunger adapted to effect a break in the electrical circuit for the heating means, said plunger being reciprocably movable between a retracted, inoperative position and a projected, operative position towards which it is spring loaded; and pawl means on the plunger releasably engageable with the ratchet wheel means to retain the plunger in its retracted position until the ratchet wheel means is allowed to rotate, wherein the improvement comprises: the provision of at least two spaced and axially aligned ratchet wheels, journal means joining the ratchet wheel such that the ratchet wheels

and journal means form together a unitary ratchet cluster; at least two pawls on the plunger which cooperate with the ratchet wheels, and spacer means disposed between the ratchet wheels about the axis of rotation of the ratchet wheels and to which the ratchet wheels are normally secured against rotation by the fusible metal, the spacer means being releasably secured to the fixed part against rotation relative thereto.

2. A thermally operative cut-out device according to claim 1 wherein the spacer means is releasably secured to the fixed part by the fusible metal.

3. A thermally operative cut-out device according to claim 1 wherein the spacer means is in the form of a block having an opening into which the journal means of the ratchet cluster is received.

4. A thermally operative cut-out device for breaking the electrical circuit of heating means of electrically heated appliances in the event of over-heating of the heating means, and where the device is of a type comprising: a fixed part; rotatable ratchet wheel means; fusible metal which normally secures the ratchet wheel means against rotation relative to the fixed part and which melts when heated above a predetermined temperature to allow the ratchet wheel means to rotate; a spring loaded plunger adapted to effect a break in the electrical circuit for the heating means, the plunger being reciprocably movable between a retracted, inoperative position and a projected operative position towards which it is spring loaded; and pawl means on the plunger releasably engageable with the ratchet wheel means to retain the plunger in its retracted position until the ratchet wheel means is allowed to rotate, wherein the improvement comprises: the provision of at least two spaced and axially aligned ratchet wheels; journal means joining the ratchet wheels so that the ratchet wheels and journal means form together a unitary ratchet cluster; at least two pawls on the plunger which cooperate with the ratchet wheels; and spacer means disposed between the ratchet wheels and releasably secured to the fixed part against rotation relative thereto, to which spacer means the ratchet wheels are normally secured against rotation by the fusible metal and with which the plunger is interconnected, and the ratchet cluster, spacer means and plunger being detachable from the fixed part as a unitary assembly.

5. A thermally operative cut-out device according to claim 4, wherein a guide pin is connected to the spacer means, which guide pin carries the plunger and guides the plunger in its reciprocable movement.

6. A thermally operative cut-out device according to claim 4 wherein the plunger is made of a sheet metal channel section bent back upon itself about transverse axes so that open sides of the channel of confronting portions thereof are towards one another and form a box-section for most of the length of the plunger, one of the confronting portions being extended and shaped to form the pawls which engage the ratchet wheels; the plunger being slidably mounted co-axially on the guide pin, and spring means mounted on the guide pin normally urging the plunger in a direction away from the spacer means.

7. A thermally operative cut-out device for breaking the electrical circuit of heating means for electrically heated appliances in the event of over-heating of the heating means, where the device is of the type comprising: a fixed part, rotatable ratchet wheel means; fusible metal which normally secures the ratchet means against rotation and which melts when heated above a pre-determined temperature to allow the ratchet wheel means to rotate; a spring loaded plunger adapted to effect the break in the electrical circuit for the heating means; the plunger being reciprocably movable between a retracted, inoperative position and a projected, operative position towards which it is spring loaded; and pawl means on the plunger releasably engageable with the ratchet wheel means to retain the plunger in its retracted position until the ratchet wheel means is allowed to rotate, wherein the improvement comprises: the provision in the ratchet means of at least two spaced and axially aligned ratchet wheels; journal means rigid with and joining the ratchet wheels so that the ratchet wheels and journal part form together a ratchet cluster; at least two pawls on the plunger which cooperate with the ratchet wheels, and spacer means disposed between the ratchet wheels about the axis of rotation of the ratchet wheels, the spacer means being provided with at least one hole which extends to the journal means of the ratchet cluster, and a slug of fusible metal being inserted in the hole which slug melts on first thermal operation of the cut-out device such that the fusible metal flows over the journal means and adjacent surfaces of the fixed part to secure the ratchet cluster to the spacer means against rotation and to secure the spacer means to the fixed part.

8. A thermally operative cut-out device according to claim 7 wherein the ratchet cluster has a bore which extends axially through the ratchet wheels and journal means, and a slug of fusible metal is inserted in the bore which slug of fusible metal thereof flows over adjacent surfaces of the ratchet cluster and the fixed part thereby to secure the ratchet cluster further against rotation.

9. An electrical heater for an electrically heated appliance, comprising a heating element; a terminal head to which the heating element is connected and which is adapted to be releasably coupled to an electrical supply coupling member; a housing which extends from the terminal head and makes thermal contact with the heating element, said housing containing a thermally operative cut-out device comprising rotatable ratchet wheel means, fusible metal which normally secures the ratchet wheel means against rotation and which melts when heated above a pre-determined temperature to allow the ratchet wheel means to rotate, a spring loaded plunger extending through the terminal head, said plunger being reciprocably movable between a retracted, inoperative position and a projected, operative position towards which it is spring loaded, the plunger when in the operative position projecting from the terminal head and being adapted to separate the terminal head from the electrical supply coupling member, and pawl means on the plunger releasably engageable with the ratchet wheel means to retain the plunger in its retracted position until the ratchet wheel means is allowed to rotate, wherein the improvement comprises the provision in the ratchet wheel means of at least two spaced and axially aligned ratchet wheels, journal means joining the ratchet wheels so that the ratchet wheels and journal means form together a unitary ratchet cluster; at least two pawls on the plunger which cooperate with the ratchet wheels, and spacer means disposed between the ratchet wheels about the axis of rotation of the ratchet wheels, to which spacer means the ratchet wheels are normally secured against rotation by the fusible metal and with which the plunger is interconnected, the spacer means being releasably securable to the housing by the fusible metal, and the ratchet cluster, spacer means and plunger being detachable from the housing and terminal head as a unitary assembly.

10. An electrical heater according to claim 9 wherein an insulating base is removably attached to the terminal head, which base carries electrical contact means to which the heating element is adapted to be connected, the housing being provided with an aperture opening into the terminal head such that the unitary assembly of the ratchet cluster, spaced means and plunger can be removed from the housing, the opening being arranged to be closed by the removable insulating base.

11. An electrical heater according to claim 10 wherein the housing and terminal head are of sheet metal and the terminal head enlarges from the housing to a mouth portion, and a plate which supports the insulating base is received into the mouth portion, the mouth portion

of the terminal head being turned over the edge of the plate to secure the plate to the terminal head.

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U.S. Cl. X.R.

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