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(54) Title: ELECTRICAL PLUG HOUSING

(57) Abstract

A housing for an electrical fitting, such as an electrical plug, comprises two mateable halves. One half (10) carries a male member (14) which faces towards the other half (12) in which a female member (16) is formed. The male member has a deformable portion (28,30) and the female member has a complementary portion (42) which is interengageable therewith. A passage (18) extends axially through the male member and a locking pin (20) is slidable in the passage. The locking pin, when in a locking position, serves to hold the two halves together.

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BACKGROUND TO THE INVENTION

This invention relates to an electrical plug housing.

A number of different connections have been developed for connecting together the base and lid of a plug housing without the use of screws.

The Snapper® plug described in South African Patent No. 76/4206 is provided with a base and a lid having first and second respective projecting members which are releasably interengageable to secure the lid to the base. The base has a slot formed in it so that a suitable flat-bladed tool, such as a screwdriver, may be inserted into the slot and operated to disengage the interengaged formations. Although this plug avoids the need for screws for screwing the base to the lid, it still requires the use of a tool to disengage the base from the lid.

SUMMARY OF THE INVENTION

According to the first aspect of the invention there is provided a housing for an electrical fitting comprising two mateable halves, a male member extending from one half towards the other half of the assembled housing a female member being formed in the other half, the male member having a deformable portion and the female member having a complementary portion which is interengageable therewith, a passage extending axially through the male member, and a locking pin being axially slidable within the passage between a locked position, in which it causes locking together of the deformable portion and the complementary portion, and a retracted position, in which it allows disengagement of the deformable portion and the complementary portion.

Preferably, the deformable portion is located towards the free end of the male member and is transversely deformable relative to the axial passage.



In a preferred form of the invention, the male member is in the form of a spigot having a deformable enlarged head portion, and the female member is in the form of a complemental socket having a chamber portion which is complementally shaped to accommodate the enlarged head portion.

Conveniently, the deformable head and part of the spigot is divided by a channel into a pair of deformable tongues, the tongues being dimensioned to be deformed inwardly towards one another by the socket walls as the spigot is inserted into the socket, and to engage against the chamber walls on full insertion of the spigot.

Advantageously, the locking pin has a manually grippable head, and a recess is formed in an outer face of one half of the housing for seating the pin head flush with or recessed relative to the outer face when the locking pin is fully inserted.

In a preferred form of the invention, the passage and the fully inserted locking pin extend completely through the assembled housing, with the end of the locking pin standing proud of the outer face of the other half of the housing.

The housing may be in an electrical plug housing, in which case one half of the housing from which the male member extends is the plug base and the other half within which the female member is formed is the plug lid.

Preferably, a plurality of terminal pins extend from the base, and the locking pin is insertable through the axial passage via the outer face of the base, so that the pin cannot be pulled out while the terminal pins are plugged into a socket.

The relative length of the locking pin and the depth of the plug housing are preferably such that, in the event of the pin being pushed out while the plug is plugged into a socket, the terminal pins are disconnected from the electrical

supply before the locking pin has been sufficiently retracted to allow removal of the plug lid from the plug base.

The invention extends to an electrical plug comprising a housing having a base, a lid, a plurality of terminal pins projecting from the base, a male member extending inwardly from the base towards the lid of the assembled plug, a complementary female member being formed in the lid, the male member having a deformable portion and the female member having a complementary portion which is interengageable therewith, a passage extending axially through the male member, and a locking pin being slidable within the passage between a locked position, in which it locks the deformable portion and the complementary portion in interengagement, to a retracted position, in which it allows disengagement of the deformable portion from the complementary portion, and consequent removal of the plug lid from the plug base.

BRIEF DESCRIPTION OF THE DRAWINGS

- Figure 1 shows a top plan view of the base of a first embodiment of an electrical plug housing of the invention;
- Figure 2 shows an underplan view of the lid which fits over the electrical plug base of Figure 1;
- Figure 3 shows a cross-sectional side view on the lines 3-3 of Figures 1 and 2 showing the base and lid mated together in the locked position;
- Figure 4 shows a cross-sectional side view on the lines 3-3 of Figures 1 and 2 showing the base and lid of the plug housing of Figures 1 to 3 being disengaged from one another;



- Figure 5 shows a top plan view of the base of a second embodiment of an electrical plug housing of the invention;
- Figure 6 shows an underplan view of the lid which fits over the electrical plug base of Figure 5;
- Figure 7 shows a cross-sectional side view of the plug base on the line 7-7 of Figure 5;
- Figure 8 shows a cross-sectional side view of the plug lid on the line 8-8 of Figure 6;
- Figure 9 shows a side view of the plug base of Figure 5;
- Figure 10 shows a front view of a locking pin used to lock together the base and lid illustrated in Figures 5 to 9, and
- Figure 11 shows a cross-sectional side view of the plug base and lid of Figures 5 and 6 in the assembled position.

DESCRIPTION OF EMBODIMENTS

The three-pin domestic electrical plug housing illustrated in Figures 1 to 4 comprises a base 10 and a lid 12. All those features of the plug housing which do not relate directly to the invention are either described in copending South African patent applications 90/10178, 90/10199 and 91/3771 or are similar to those of a conventional three-pin domestic plug, and will therefore not be described or illustrated in any detail.

A male member, in the form of a spigot 14 extends inwardly from the base 10 of the plug, and a female member in the form of a complementary socket 16

is formed in the lid 12 of the plug housing. A round cylindrical passage 18 extends axially through the centre of the spigot 14, and accommodates a locking pin 20, which is able to move axially up and down within the passage 18. The locking pin 20 has a head portion 22 of greater cross-sectional diameter, the trailing face of which seats on a shoulder 24 when the pin 20 is in the retracted position, as is shown in Figure 4.

A diametrical channel 26 extends downwardly from the end of the male member 14, dividing it into a pair of tongues 28 and 30. A transversely extending lip 32 is formed at the free end of each tongue 28 and 30. The socket 16 defined in the lid 12 of the plug housing is in the form of a round cylindrical passage extending from an outer face 34 of the lid of the plug to an inner face 36 thereof. The cavity 16 has a restricted opening section 38 extending inwardly from the inner face 36 and broadening into an expanded chamber section 40.

As can clearly be seen in Figure 3, when the base 10 and lid 12 are mated together in the locked position, the lips 32 are accommodated snugly in the chamber section 40 of the cavity 60. The locking pin 20 is fully inserted into the passage 18, the head 22 of the locking pin 20 serving to lock the lips 32 firmly in position against the expanded portion 40 and shoulders 42 of the cavities 16, and preventing inward deformation of the tongues 28 and 30.

If the base 10 and lid 12 of the plug need to be separated for the purposes of wiring up the plug, the pin 20 is retracted, as is shown in Figure 4. Retraction of the pin 20 is facilitated by the combination of a gripping head 44 being provided on the pin and an indent 46 being formed in the upper face 48 of the base 10 at the end of the passage 18. When the pin 20 is in a locked position, as is illustrated in Figure 3, a gap exists between the indent 46 and the gripping head 44 of the pin, allowing the head 44 of the locking pin to be gripped between the finger nails and to be pulled out.



A pair of bosses 50 are formed in the lower face of the lid 12, so as to register with corresponding recesses 52 formed in the upper face 48 of the base 10 to ensure that the base 10 and lid 12 are accurately aligned when locked together.

Once the pin has been retracted to the position shown in Figure 4, the lid 12 can then be separated from the base 10 by merely pulling the two halves apart from one another. As both the lips 32 and the shoulder 42 have a smoothly rounded outer surface, the lips 32 are able to slide into the restricted opening section 38, while they undergo slight deformation. Insertion of the male member 14 into the cavity 16 also involves the intermediate step shown in Figure 4, the tongues 28 and 30 being inwardly deformed against the cavity walls prior to the lips 32 being accommodated in the chamber portion of the cavity 16.

Referring now to Figures 5 to 11, a second embodiment of an electrical plug housing 52 is shown comprising a base 54 and a lid 56. A spigot 58 projects from the base 54 and terminates in an enlarged head 60. A square cylindrical passage 62 extends axially through the spigot 58 for accommodating a locking pin 64. Both the locking pin 64 and the passage 62 are square cylindrical in form and are rectangular in cross section, in order to prevent rotation of the locking pin within the passage. A diametrically extending slot 66, which represents a diametric transverse extension of the passage 62, divides the enlarged head portion 60 and part of the spigot 58 into a pair of inwardly deformable tongues 68 and 70.

The lid 56 of the housing has a boss 72 extending upwardly from its upper surface 74. The boss 72 effectively increases the depth of a chamber 76 formed at the upper end of a cylindrical socket 78.

In order to increase waterproofing of the electrical plug housing when in the assembled position, the lid 56 has an outer peripheral rim 80 on its lower



surface which locates within a complementary peripheral channel 82 formed in the upper surface of the base 54. Furthermore, in order to prevent the ingress of moisture via the gap between the spigot 58 and the walls of the socket 78, an annular seat 84 is formed in the lower face of the plug lid 56, and a corresponding annular seat 86 is formed in the upper face of the base 54 for accommodating an O-ring 79.

A pair of pins 90 and 92 having rearwardly tapering ends 94 extend from the rear portion of the plug lid. The pins 90 and 92 seat in complementary apertures 96 and 98 formed in the plug base.

The pin 64 has a frusto-conical head 100 from which a shaft 102 extends. The shaft 102 has a stepped portion 104 which locates against a seat 106 within the passage 62 in order to prevent complete withdrawal of the pin. As can be seen at 108 in Figure 11, the end of the pin shaft 102 stands proud of the upper surface of the boss portion 72 of the plug lid when fully inserted. In the fully inserted position the head 100 of the pin nests snugly within a complementary recess 110 formed in the lower face of the plug base, with the outer surface of the head 100 lying flush with the lower face.

When the plug needs to be disassembled for the purposes of rewiring, for instance, the pin 114 is removed by merely depressing that portion 108 of the end of the pin which stands proud of the boss 72. Once the pin has been partly dislodged, the exposed pin head 100 can be gripped by the fingers and the pin can be retracted to the position in which the plug lid 56 can be separated from the plug base 54. Inward deformation of the tongues 68 and 70 occurs in exactly the same manner as was described with reference to Figure 4. It is clear that when the electrical plug is plugged into a wall socket or the like, the pin 64 is held captive, with the head 100 of the pin locating against the face plate of the socket.

An attempt may be made to remove the plug lid from the plug base while the



electrical plug is still plugged in. This may possibly be achieved by pushing down on the exposed portion 108 of the pin and simultaneously withdrawing the plug from the wall socket. The length of the pin 64 and the axial displacement of the interengaging portions of the head 60 and chamber 76 is such that the terminal pins are disconnected from the electrical supply before the locking pin has been sufficiently retracted to allow removal of the plug lid from the plug base. For instance, a conventional three-pin domestic plug is disconnected from the electrical mains once it has been withdrawn a short distance from the face plate of the wall socket. The pin 64 has to extend by more than that distance before the tongues 68 and 70 are able to deform sufficiently so as to facilitate removal of the plug lid from the plug housing.

An advantage of the invention that it provides a safe way of engaging and disengaging the base and lid of a plug housing without using any tools. The engagement and disengagement of the base and lid are merely effected by withdrawal or insertion of the locking pin 18, and axial movement of the locking pin 20 is prevented when the plug is plugged into a wall socket or the like.

The invention is not confined to a domestic electrical plug housing but may be used to releasably engage the lid and base of a housing for any electrical fitting.

CLAIMS

1. A housing for an electrical fitting comprising two mateable halves, a male member extending from one half towards the other half of the assembled housing and a female member being formed in the other half, the male member having a deformable portion and the female member having a complementary portion which is interengageable therewith, a passage extending axially through the male member, and a locking pin being axially slidable within the passage between a locked position, in which it causes locking together of the deformable portion and the complementary portion, and a retracted position, in which it allows disengagement of the deformable portion and the complementary portion.
2. A housing as claimed in claim 1 in which the deformable portion is located towards the free end of the male member and is transversely deformable relative to the axial passage.
3. A housing as claimed in either one of the preceding claims in which the male member is in the form of a spigot having a deformable enlarged head portion, and the female member is in the form of a complementary socket having a chamber portion which is complementally shaped to accommodate the enlarged head portion.
4. A housing as claimed in claim 3 in which the deformable head and part of the spigot is divided by a channel into a pair of deformable tongues, the tongues being dimensioned to be deformed inwardly towards one another by the socket walls as the spigot is inserted into the socket, and to engage against the chamber walls on full insertion of the spigot.
5. A housing as claimed in any one of the preceding claims in which the locking pin has a manually grippable head, and a recess is formed in an



outer face of one half of the housing for seating the pin head flush with or recessed relative to the outer face when the locking pin is fully inserted.

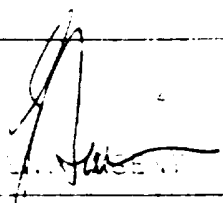
6. A housing as claimed in claim 5 in which both the passage and the fully inserted locking pin extend completely through the assembled housing, with the end of the locking pin standing proud of the outer face of the other half of the housing.
7. A housing as claimed in any one of the preceding claims which comprises an electrical plug housing, one half of the housing being the plug base and the other half being the plug lid.
8. A housing as claimed in claim 7 in which the male member extends from the plug base and the female member is formed in the plug lid.
9. A housing as claimed in claim 8 in which a plurality of terminal pins extend from the base and the locking pin is insertable through the axial passage via the outer face of the base, so that the pin cannot be pulled out while the terminal pins are plugged into a socket.
10. A housing as claimed in claim 9 in which the relative length of the locking pin and the depth of the plug housing are such that, in the event of the pin being pushed out while the plug is plugged into a socket, the terminal pins are disconnected from the electrical supply before the locking pin has been sufficiently retracted to allow removal of the plug lid from the plug base.
11. An electrical plug comprising a housing having a base, a lid, a plurality of terminal pins projecting from the base, a male member extending inwardly from the base towards the lid of the assembled plug, a complementary female member the lid, the male member having a

deformable portion and the female member having a complementary portion which is interengageable therewith, a passage extending axially through the male member, and a locking pin being slidable within the passage between a locked position, in which it locks the deformable portion and the complementary portion in interengagement, to a retracted position, in which it allows disengagement of the deformable portion from the complementary portion, and consequent removal of the plug lid from the plug base.

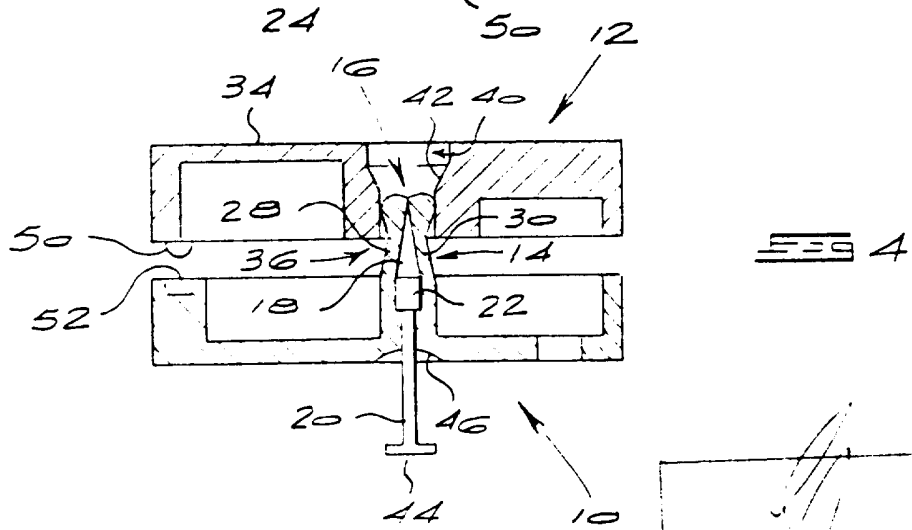
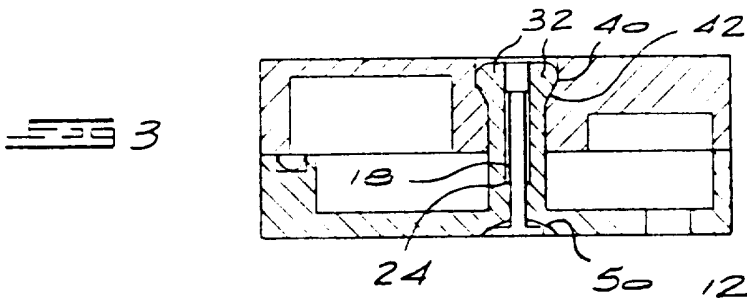
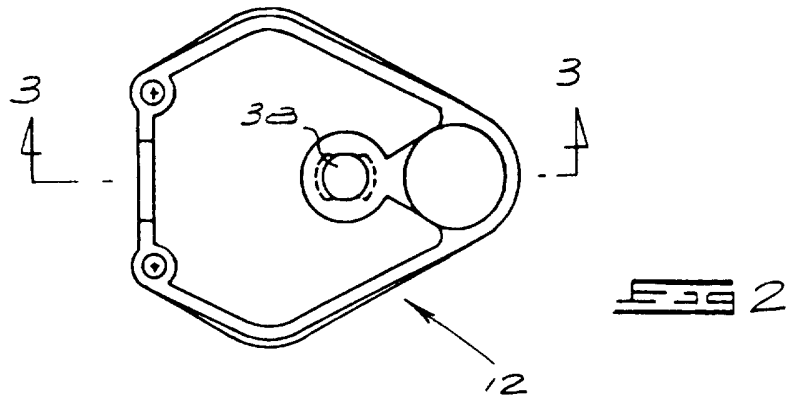
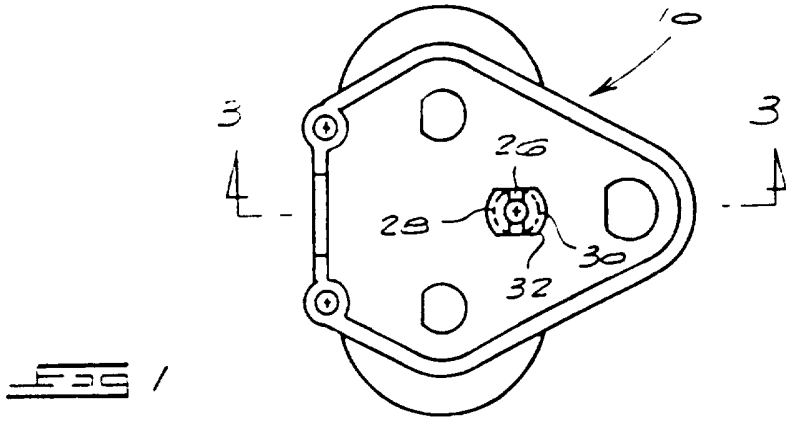
~~12. A housing for an electrical fitting substantially as herein described with reference to either one of the illustrated embodiments.~~

13. An electrical plug substantially as herein described with reference to either one of the illustrated embodiments.

Dated on this 18 Day of December 1991.

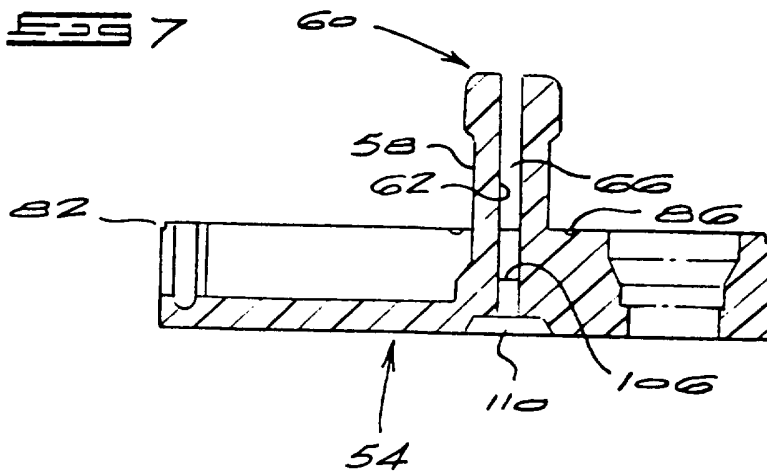
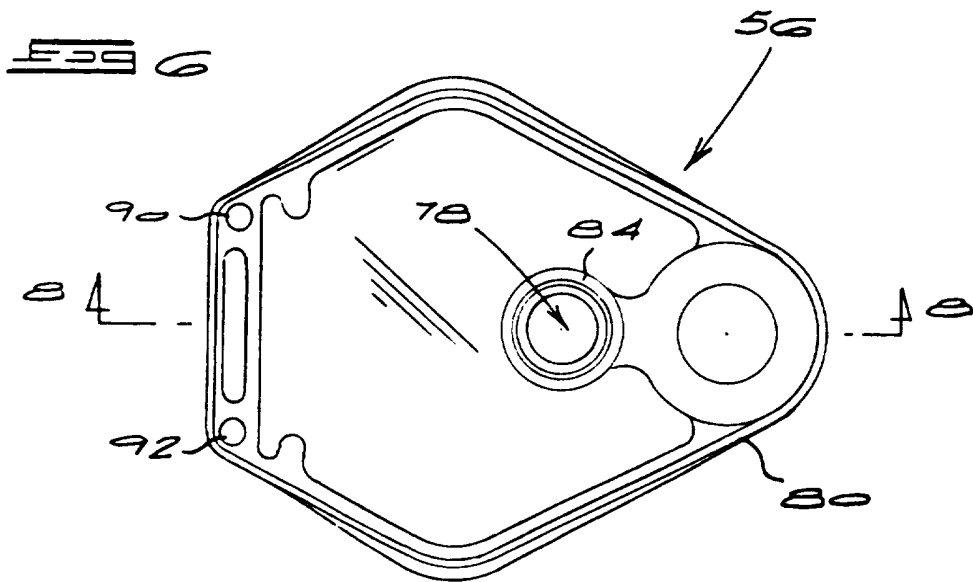
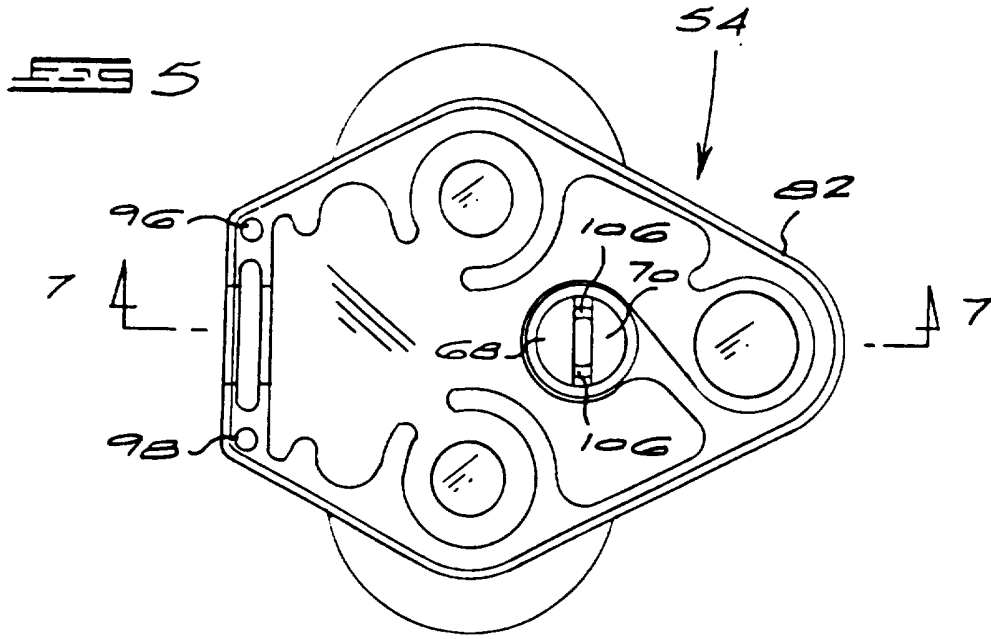




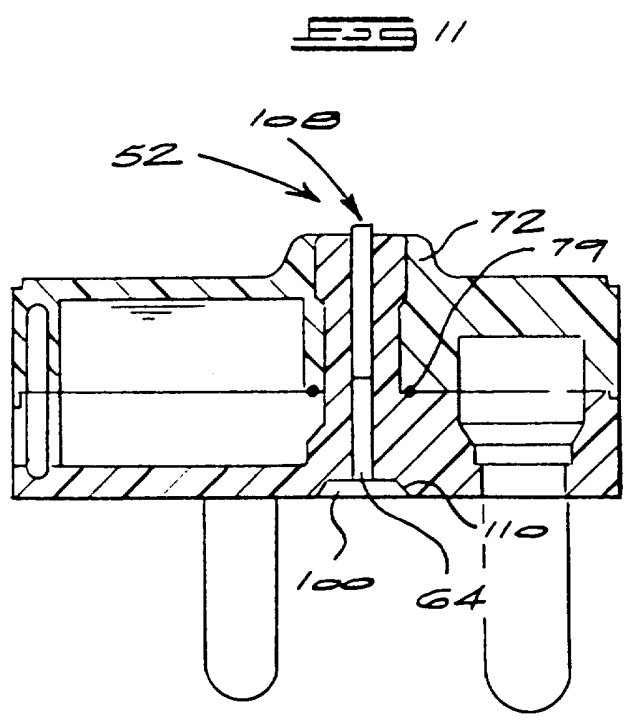
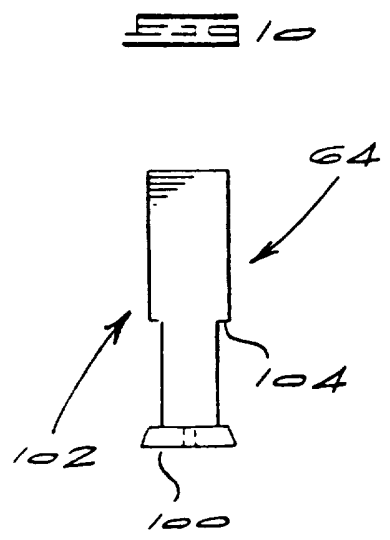
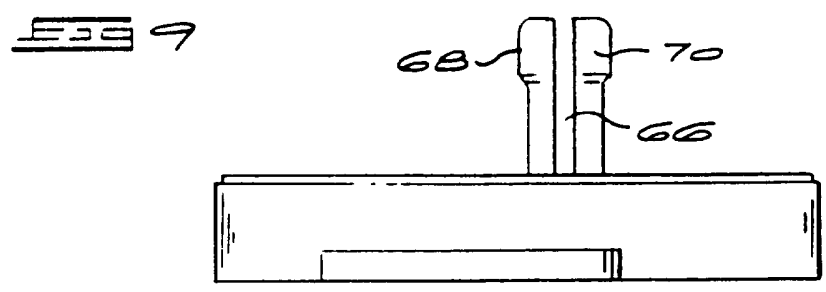
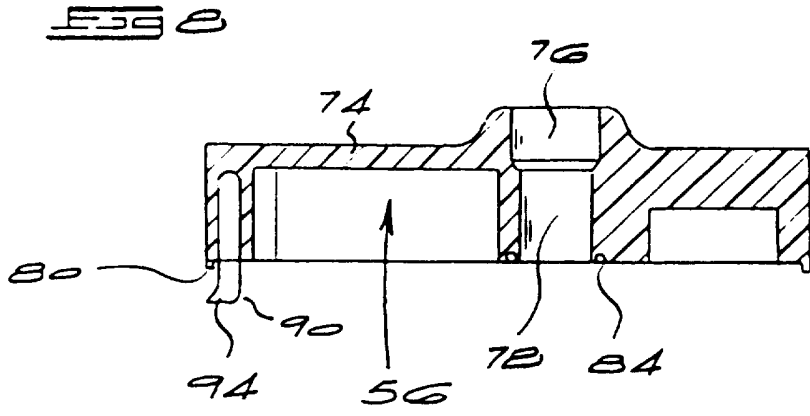


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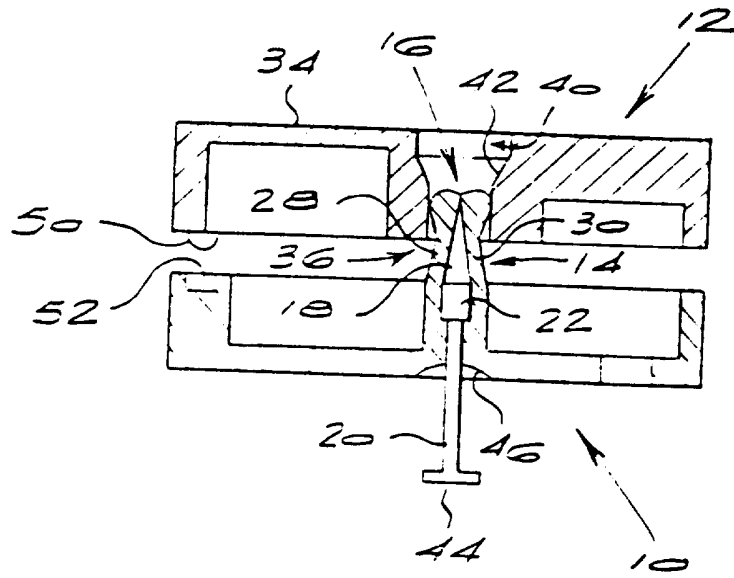
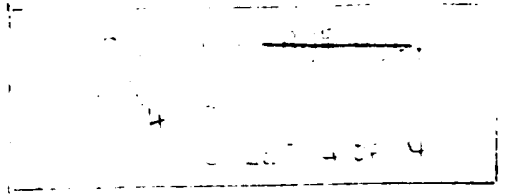


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