Aug. 18, 1964

R. VRADENBURGH

3,145,279

ENCLOSED MULTIPOLE RELAY

Filed April 7, 1961

2 Sheets-Sheet 1

Fig. 1.

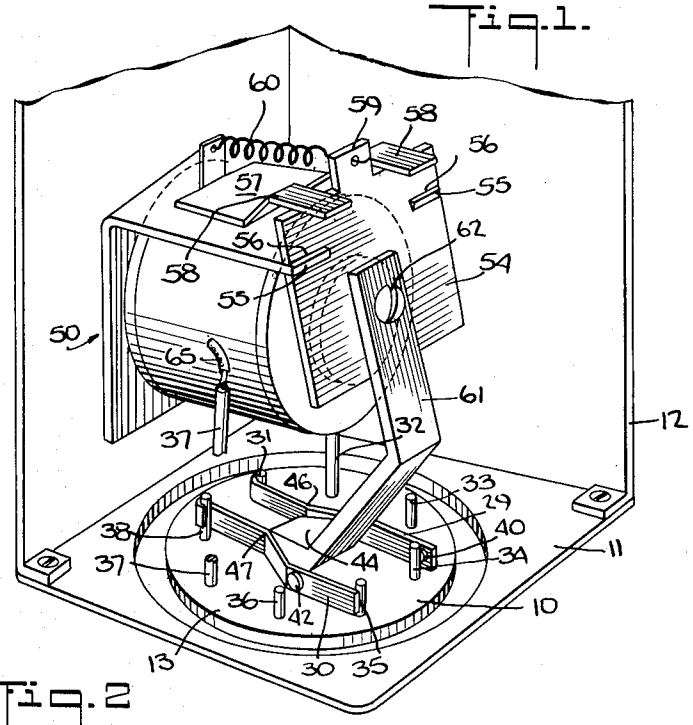


Fig. 2.

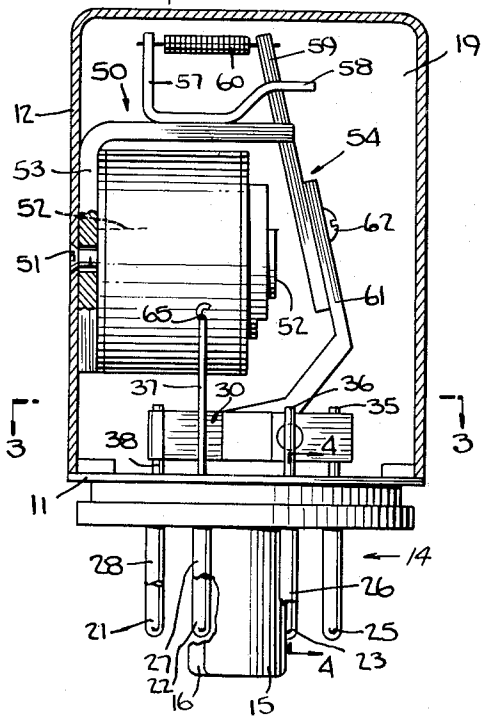
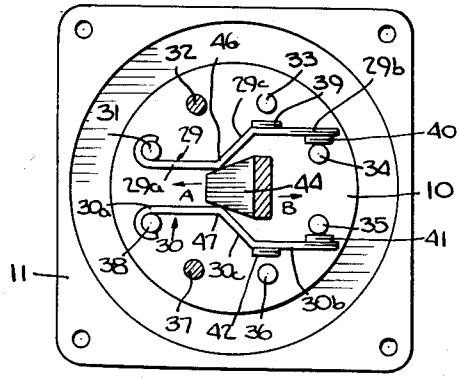


Fig. 3.



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Fig. 6.

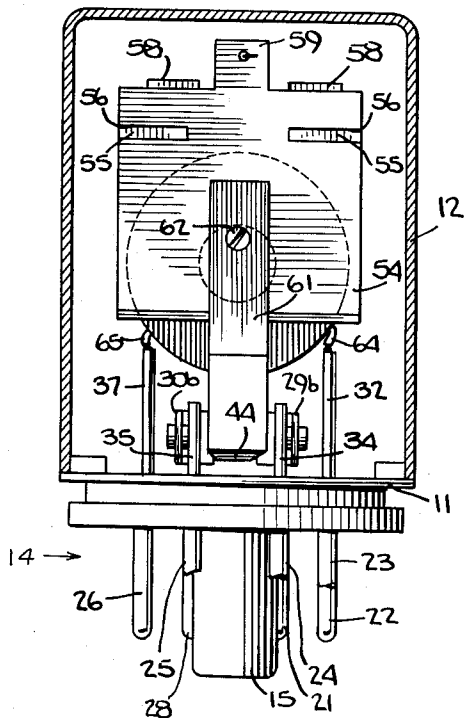


Fig. 4.

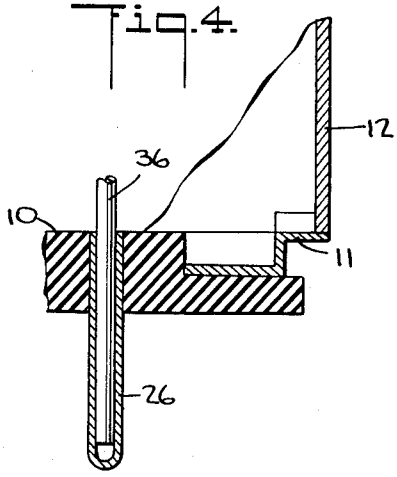
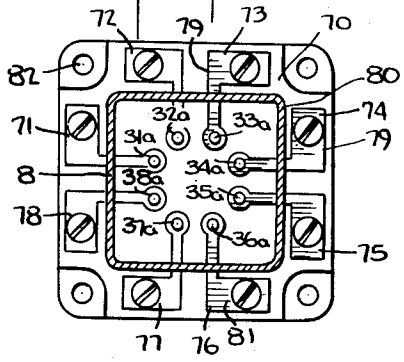


Fig. 7.



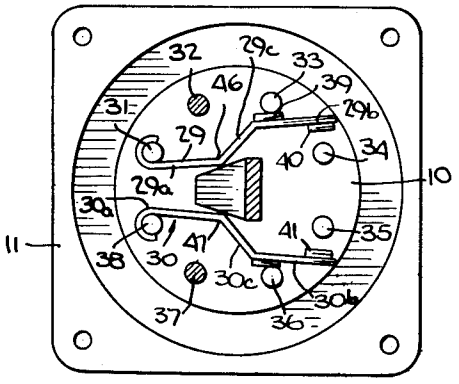


Fig. 5.

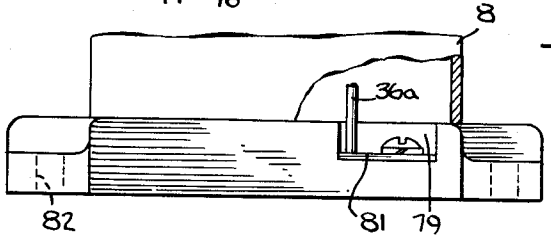


Fig. 8.

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3,145,279

ENCLOSED MULTIPOLE RELAY

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Filed Apr. 7, 1961, Ser. No. 101,483
3 Claims. (Cl. 200—104)

This invention relates to enclosed electrical relays and particularly to the assembly and form of the components.

An object of the invention is to provide an improved and simplified enclosed relay.

Another object of the invention is to provide an improved enclosed relay that minimizes the number of components and the number of manipulative steps to assemble.

FIG. 1 is a perspective view of the plug-in type relay with the enclosing cover illustrated in section;

FIG. 2 is a side view of plug-in type relay with enclosing cover in section;

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary sectional view of the base portion taken along lines 4—4 of FIG. 2;

FIG. 5 illustrates the relationship of the armature and contacts on energization of the relay;

FIG. 6 is a front sectional view of the pin type enclosed relay with the cover illustrated in section;

FIG. 7 is a sectional view of the front connected type enclosed relay; and

FIG. 8 is a side view of the base of the front connected type relay.

Referring to FIG. 1, a plug-in type enclosed relay is illustrated. This relay comprises a base **10** with a supporting flange **11** and an enclosing cover **12** mounted on the flange. The base **10** comprises a disc shaped molded plastic member **13** with electrically conductive hollow prongs **14** molded therein.

In this embodiment the base is provided with eight prongs circumferentially arranged in an evenly spaced relation. A tongue **15** with a key **16** is provided at the center of the base for properly positioning the base and guiding the insertion of the prongs into the appropriate terminals of a socket. The supporting pins **31, 33, 34, 35, 36** and **38** are solid, cylindrical metal pieces and are easily inserted in the prongs **21, 23, 24, 25, 26** and **28** and firmly fastened thereto by any conventional means. The pins extend above the disc member **13** to provide electrically conductive means in the enclosed chamber **19** formed by the base and cover. The pins extend a sufficient distance to provide ample space for engagement and fastening of electrical elements. The electromagnet with the armature is mounted on the cover. The contacts are mounted on the base which is separable from the cover.

The resilient contact mounting members **29** and **30** are securely fastened to the pins **31** and **38** and have contact buttons **39, 40** and **41, 42** for engaging the pins **33, 34** and **35, 36** respectively. The contact mounting means **29** and **30** are resiliently biased to normally engage the pins **34** and **35**.

In this embodiment the contact mounting members **29** and **30** are elongated thin resiliently stiff metal pieces having straight portions **29*a*** and **30*a*** fastened to the pins **31** and **38** and straight portions **29*b*** and **30*b*** on which the contact buttons are mounted. The straight portions are connected by sloped portions **29*c*** and **30*c*** to form edges **46** and **47**. A wedge-shaped member **44** is provided to engage the edges **46** and **47** which on movement in direction indicated by the arrow A forces the contact buttons against the pins **33** and **36** and on movement in direction of the arrow B releases the pressure to permit the buttons to normally engage the pins **34, 35**.

The electromagnet **50** is fastened to cover **12** by means of a bolt **51** passing through the cover and threading into the core **52** of the electromagnet. The L-shaped frame **53** is also mounted with the electromagnet on the cover **12** engaging the core **52** and pivotally supporting the armature **54** to engage the opposite end of the core **52** to complete the flux path. The L-shaped frame has spaced projections **55** fitting notches **56** on the edges of the armature **54**. On top of the L-shaped frame is a spring support **57** having a forked member **58** between which the prong **59** of the armature extends. The helical spring **60** is attached to the prong **59** and to the spring support **57** to pivot the armature **54** away from the core **52** on deenergization of the winding.

The armature **54** is of ferromagnetic material and completes the outside flux path for the relay. An insulating or insulated actuating member **61** is attached by the bolt **62** to the armature and extends toward the base **10** between the resilient contact members **29** and **30**. The actuating member **61** supports the wedge-shaped member **44** to engage the edges **46** and **47** on the resilient contact members **29** and **30**. The electromagnet with the wedge-shaped member **44** is separable from the base and contact members by unfastening the cover **12** and for complete separation the leads **64** and **65** are unsoldered.

The winding of the electromagnet is supplied with current through the prongs **22** and **27**. Pins **32** and **37** fit in the prongs **22** and **27** and are attached adjacent to the electromagnet by means of the flexible cables **64, 65**. The flexible cables **64** and **65** are spaced from the pins and the resilient contact members so as not to engage the other conductive members of the relay.

In FIGS. 7 and 8 the plug-in base is replaced by a base **70** having terminals accessible on the same side of the base as the electromagnet. In this embodiment the electromagnet is also supported by the casing in a similar manner to the embodiment illustrated in FIG. 2. The pins **31*a*** to **38*a*** are rigidly fastened to the terminal members **71–78**. The terminal members have an L shape fitting in grooves **79**. The cover **80** is mounted on the base and fastened thereto by suitable means. The grooves **79** extend exteriorly to the cover **80** to locate the terminal portions **71–78** outside the cover readily accessible for fastening leads to the relay. The relay is mounted to a panel or chassis or the like by means of bolts through the holes **82** at the corners of the base. The pins **31*a*** through **38*a*** are similar to pins **31** to **38** and support the resilient members **29*a*, 30*a*** and pass current therewith.

From the foregoing description it will be seen that a new improved enclosed relay has been developed. The attachment of the contacts to the prongs in the base has been greatly simplified by inserting solid cylindrical pins into the base and using the projecting portion as the means for mounting the resilient contacts and as electrical fixed contacts. Thus by inserting and fastening the pins in the prongs a completed contact is provided. The use of the pins also eliminates the difficult insertion of flexible stranded leads into the hollow prongs. Thus not only is the entire structure of the fixed contact simplified but the fastening of the fixed contacts and other leads to the prongs is also greatly simplified.

The separation of the resilient contact members from the electromagnet provides for an accurate positioning of the movable contact members in relation to the fixed contacts. The same supporting element is used to support both the fixed contacts and the movable contacts.

Further, the separation of the movable contact members from the electromagnet structure eliminates the requirement for flexible conductive leads and thus eliminates all the manufacturing steps for connecting the contacts

to the prongs. This separation also permits the mounting of the electromagnet on the cover so that the electromagnet may be mounted on the cover separate from the mounting of the movable contacts. Any variations in positioning of the electromagnet in relation to the movable contacts may be compensated for by the size of the wedge-shaped member.

Another unexpected advantage of the foregoing structure is that the cam action of the wedge-shaped member against the sloped sides and edges of the resilient contact members produces a wiping or self-cleaning action between the contact buttons and the fixed contact pins. Another feature of the wedge or cam action between the wedge-shaped member and the resilient contacts is the reduced force required to hold the contacts in the closed position on energization of the electromagnet. The contact members are flexed in opposition and therefore produce only a relatively small component of force to the moving magnetic armature in a direction that would tend to unseat it. This reduction of the unseating force minimizes the A.C. hum. Thus in addition to providing for a simplified enclosed relay that is easy and inexpensive to manufacture, the relay has operative advantages not heretofore realized in previous relays. The key **16** is illustrated in relation to the pins to fit in sockets adapted for relays of this type. However, the key may be positioned at other locations to fit in other types of sockets.

Various modifications and changes may be made in the various components without departing from the invention as set forth in the appended claims.

I claim:

1. An enclosed electromagnetic relay comprising a base having at least two pairs of conductive pins extending from said base, two thin resilient metal contact members extending generally parallel to one another in spaced relation and secured at one end to a respective pin of one pair and extending to flex in and out of engagement with a respective pin of the other pair, an electromagnet having an armature having a free end positioned between said contact members and having the other end pivotally attached to the electromagnet to move said first end parallel to said contact members on actuation of the armature, said contact members having facing sloped surfaces and said armature having a wedge-shaped piece on the end of the armature between said contact members and engaging said surfaces to actuate said contact members

in opposite directions to vary the relationship of the engagement of said contact members and the respective conductive pins.

2. An enclosed electromagnetic relay as set forth in claim 1 wherein said base has an inner center portion and a terminal portion and a plurality of grooves extending from said terminal portion into said inner center portion on one side of said base, said pins extending from said base on the same side as said grooves and located within said inner center portion, a cover mounted on said base separating said terminal portion and said center portion to enclose said pins, said contact members and said electromagnet, terminals positioned in said grooves extending from said terminal portion into said center portion and electrically attached to said pins.

3. An enclosed electromagnetic relay comprising a base and a tubular shaped cover mounted on said base and forming an enclosing chamber with said base, an electromagnet mounted on said cover and having an armature extending toward said base and actuated to move generally parallel to said base, a plurality of supporting pins extending through said base for providing conductive paths from said enclosed chamber, said pins extending from said base into said chamber, elongated ribbonlike resilient metal contact members extending generally parallel to said base and each pivotally secured at one end to a respective pin to resiliently move transversely to said pins and to the movement of said armature, said contact members in an engaging relation with said pins and said armature separably engaging said contact members to move said contact members in opposite directions to alter the engaging relation on energization and deenergization of said magnet.

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