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Hayden

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[54] **INVERTED LOW LOSS RELAY STRUCTURE**

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[51] **Int. Cl.** **H01h 50/14**

[58] **Field of Search** 335/185, 187, 203

[56] **References Cited**

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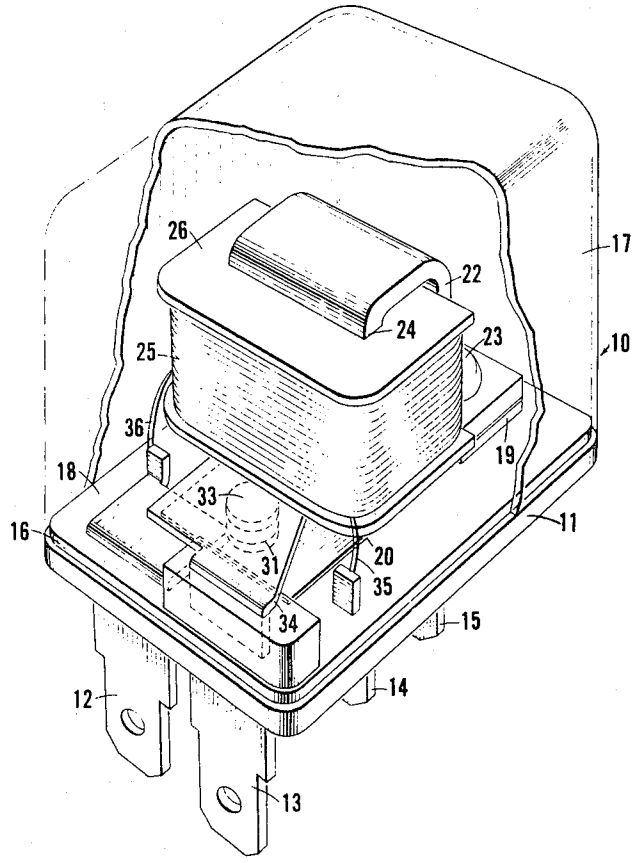
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[57] **ABSTRACT**

The following specification sets forth a structure defining an electrical relay of the direct current high amperage type adapted for automotive use and in which the relay contacts are so arranged relative to the terminals as to provide a short low resistance path.

4 Claims, 2 Drawing Figures



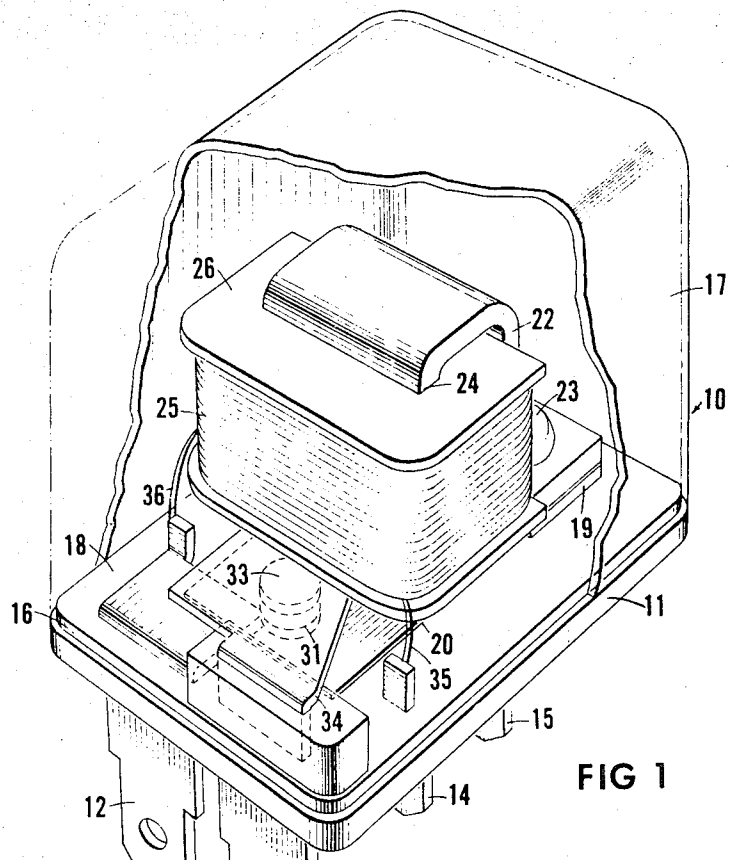

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FIG 1

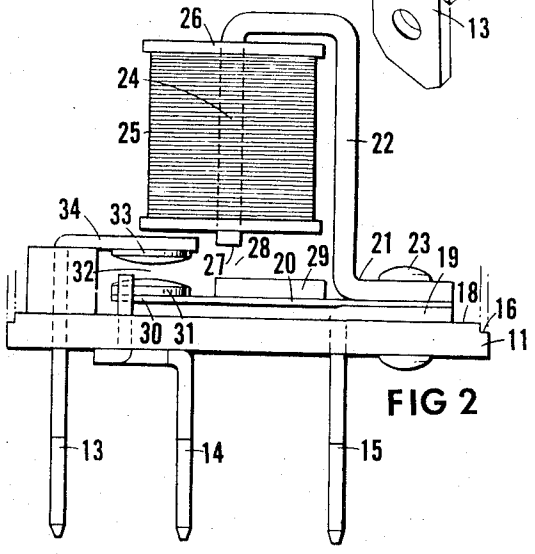

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FIG 2

INVERTED LOW LOSS RELAY STRUCTURE

This invention relates to an inverted low loss relay structure adapted for direct current automotive use.

In recent years certain relay controlled circuits in automobiles have been required to handle larger currents whereas formerly a twenty ampere rating relay circuit was regarded as a heavy current circuit. In present automobile circuitry there is a requirement for the relay switching of currents of forty amperes, sixty amperes and as much as eighty amperes in some control devices. In the past, heavy current relays in such application have been characterized by a noticeable power and heat loss due to the resistance of the connection within the relay between the relay contacts and the relay terminals. Generally, relay structures in automobile applications have been of the upstanding type, that is to say the relay coil stands on a base and the terminals extend from the base, the relay contacts associated with armature mechanism being superposed above the relay coil remote from the base. In such relay structures the base supports a housing enclosing the relay components and the relay terminals extend from the base in the form of plug-in tynes or prongs adapted to be inserted into a receiving socket. Thus the relay structure of the prior art necessitates an electrical connection of a length substantially equal to the length of the coil extending between the relay contacts and the relay terminals in the base.

It is an object of the invention to provide a relay structure for direct current automobile heavy current use in which the components are arranged in an inverted manner to locate the relay contacts immediately next to the relay terminals to provide an electrical path between the terminals and the contacts of minimum length.

It is another object of the invention to provide an inverted relay structure comprising a minimum number of sturdy simple components of low voltage loss.

Other objects of the invention will be appreciated by a study of the following specification taken in conjunction with the accompanying drawings.

IN THE DRAWINGS

FIG. 1 is a cutaway aerial perspective view of an inverted relay according to the invention;

FIG. 2 is a side elevation of the relay of FIG. 1 with the cover or housing removed.

Referring to the drawings, the inverted relay **10** of the invention comprises a moulded base **11** formed of insulating material with the terminals **12, 13, 14** and **15** fixed in the base during the moulding operation. Base **11** in peripheral recess **16** is adapted to tensionably receive the housing **17** extending thereabove to enclose the relay structure therewithin and above said base. Contact terminal **15** rises through base **11** and extends laterally over the upper surfaces **18** of the base to provide a rigid metal platform portion **19** on which is mounted the relay armature member **20** held thereon by mounting flange **21** of a stationary, inverted U-shaped core member **22,** flange **21** and armature **20** support platform portion **19** and base **11** being fastened rigidly together by a generous rivet **23.** The depending arm **24** of core **22** carries a relay coil **25** on a coil form structure **26,** the free end **27** of the stationary core part being spaced by a gap **28** from the movable core part **29** fastened to the armature **20** in a position adapted to complete the magnetic circuit of the core **22** upon current flowing in coil **25.** The free end **30** of the armature carries a generous relay contact **31** normally defining a contact gap **32** with the superposed stationary contact **33** rigidly depending from the contact arm **34** of contact terminal member **13.** It will be observed that the thickness of platform **19** serves to space the armature **20** from the upper surfaces **18** of the base **11** and that such platform serves the dual purpose of a mounting for the core as well as an electrical connection from the armature and its movable contact to the terminal **15** thereby deriving a number of advantages from the simplicity of this arrangement and especially a short current conducting path. The coil **25** connects by its leads **35, 36** to coil terminals **14** and **12.**

It will be observed that the arrangement of relay components of the invention is such as to provide for the assembly of the core, flexible armature, movable contact, terminal and base with one rivet in such manner that the armature is located nearest the base in proximity to the inner surface thereof to enable the flange **19** to be as short as possible and flange **34** in association with its terminal portion **13** to be of minimum length. In this arrangement which may be regarded as of the inverted type the relay contacts are located between the base and the relay coil.

I claim:

1. In a low loss high current relay having a relay winding, a stationary core part supporting the winding, a flexible relay armature strip having a contact on its free end and carrying a movable core part, a fixed contact adapted to be engaged by said first relay contact and a base of an insulating material, a contact terminal arrangement comprising: an armature terminal extending through the base and having a large, contacting flange overlying and in engagement with the inner surfaces of the base and supporting a portion of said stationary core part, the other end of said armature strip being supported and fixed between said stationary core part supporting portion and said contacting flange to locate said armature strip in close proximity to said armature terminal and said base and between said base and said stationary core part; and a large fixed contact terminal extending through said base and embodying an integral contact mounting flange adapted to locate the fixed contact of the relay in a position for engagement by said first relay contact on the free end of said armature strip.

2 A low loss high current relay contact terminal arrangement according to claim **1** wherein a single rivet connects said stationary core part portion, said armature strip, said armature terminal flange and said base in a rigid assembly.

3 A low loss high current relay contact terminal arrangement according to claim **1** wherein said armature terminal and said fixed contact terminal, including the flange portions thereof, are of minimum length.

4. A low loss high current relay comprising a base of insulating material, an armature terminal extending through said base and having a large, integral contacting flange overlying and engaging the inner surface of said base, a flexible relay armature strip carrying a movable contact on its free end and having a fixed end overlying and in engagement with said flange on said armature terminal and carrying a movable core part between its fixed end and said movable contact, a large fixed contact terminal extending through said base and having a short, integral flange spacedly overlying said

base and carrying a fixed contact positioned for engagement by said movable contact, a stationary core part having a first portion in the form of a short, substantially planar, supporting flange and a second portion of a substantially inverted "U" shape having one leg joined to said supporting flange and another leg spaced from said one leg and terminating in a free end, and a relay coil mounted on said other leg of said stationary core part, said stationary core part supporting flange overlying said armature terminal contacting flange and said fixed end of said armature strip being disposed between said flanges, said end of said strip and said flanges being clamped together and to said base by

a rivet connection, said free end of said other leg of said stationary core part being disposed spacedly above said movable core part, and said fixed and movable contacts being disposed between said base and said relay coil, the spacing between said legs of said inverted "U"-shaped stationary core part portion being substantially less than the length of said relay coil whereby the length of the current path between said contacts, when engaged, and said armature terminal is rendered minimal thereby providing a relay which is highly efficient for use in high current applications.

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