

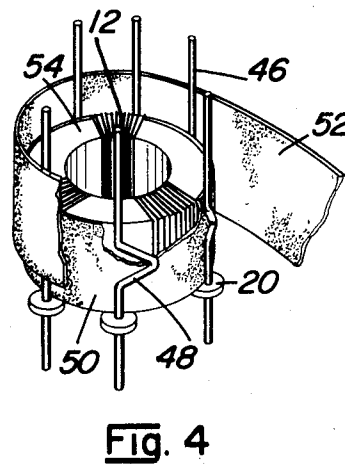
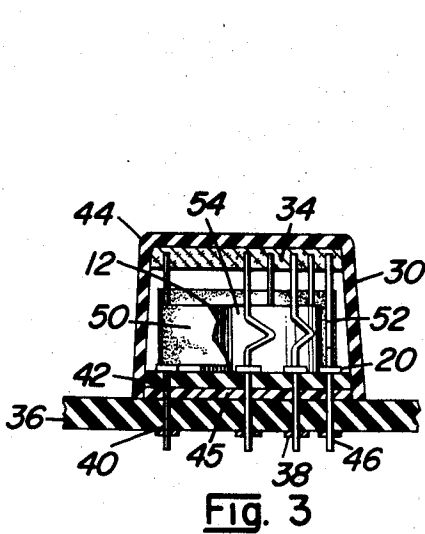
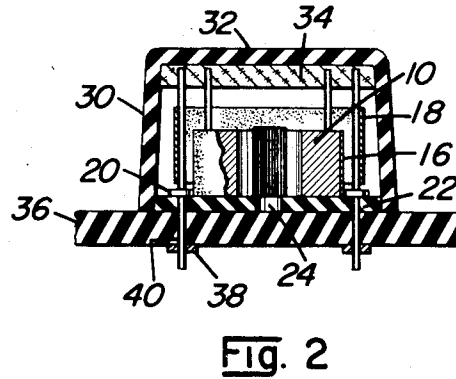
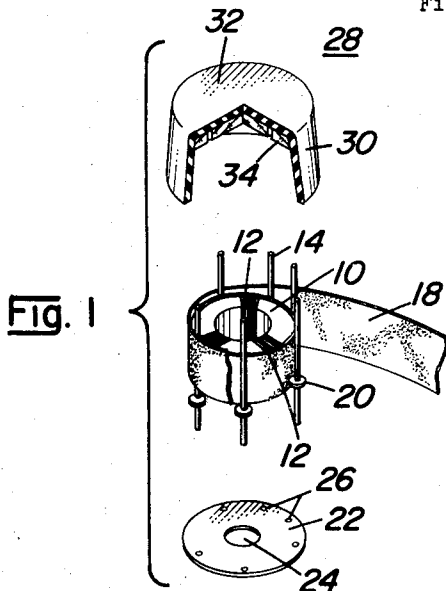
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TRANSDUCER UNIT

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TRANSDUCER UNIT

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This invention relates to transducers and particularly improvements in transducer designs adapted for pulse transformers, magnetic memory elements, and the like.

An important object of the invention is to provide a compact, transducer unit which is formed of parts readily available on the market and can be tested prior to complete assembly to assure uniformity of action. Another important object of the invention is to provide a transducer unit which is lighter in weight than those heretofore employed, provides a supporting medium for the pins or rods to hold them relatively firmly in place and which may be disassembled for repair or replacement of parts. A further important object of the invention is to provide a transducer unit of this character which is formed of parts capable of rapid manufacture and quick assembly and which is readily attachable to and removable from panels and like supporting members.

In carrying out the objects of the invention, the transducer includes a shell or cover which is very similar to bottle caps and in fact may be a conventional bottle cap. The wound magnetic core is associated with a plurality of rods or pins and this sub-assembly is received in the shell or cap and retained therein against accidental disengagement. A feature of the invention is the provision of a relatively soft medium inside the cover or cap and, preferably, extending over the closed end thereof, which is indented by the rods or pins to hold them firmly against movement. The opposite end sections of the pins project from the cap and are available for insertion in holes formed in sockets on panels or like supporting members. The invention eliminates the necessity for encapsulating the sub-assembly in thermo-setting plastic material which has heretofore been employed to lock the elements of the sub-assembly against relative movement. By omitting this step, and the material used therefore, it results in a saving in the cost of producing the transducer as well as providing a lighter weight unit for this purpose. Another feature of this invention is the provision for restraining each projecting rod or pin of the transducer unit from rotating about its axis.

Various other objects, advantageous and meritorious features of the invention will become more fully apparent from the following specification, appended claims and accompanying drawings wherein:

Fig. 1 is an exploded perspective view of one form of the invention, showing the several elements of the transducer in the order of their assembly;

Fig. 2 is a vertical sectional view through the embodiment of the invention illustrated in Fig. 1 showing a completely assembled transducer unit mounted on a panel or other supporting member;

Fig. 3 is a vertical sectional view similar to Fig. 2 but showing a modified form of transducer assembly, and

Fig. 4 is a perspective view of the subsidiary core assembly of the transducer partly broken away to show the formation of the pins.

Referring particularly to Figs. 1 and 2, the embodi-

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ment of the invention illustrated therein comprises a sub-assembly including a magnetic core 10 of the solid ring type around which one or more windings 12 are wound. In this instance three such windings are shown in Fig. 1, it being understood that lesser or greater numbers of such windings may be applied to the core. Circularly disposed around the core 10 are a plurality of pins or rods indicated by the reference characters 14. The rods extend substantially parallel to the axis of the core and closely adjacent to the outer surface thereof. A pair of rods is associated with each winding. One end of each winding is attached to one rod of the pair with which it is associated and the other end of the winding is connected to the other rod of such pair of rods. Such connections are omitted from the drawing for the reason that it is standard practice for transducer assemblies of this kind.

To insulate the rods from the core and, at the same time, hold them against the core, there is provided a pair of electrically insulating strips or tapes 16 and 18. The tapes preferably have thermosetting properties and are heat-treated when assembled in place. One strip 16 closely hugs the core and overlies the windings thereon to insulate the same from the rods. The other strip 18 is wound one or more turns around the rods 14 as indicated in the drawing and tends to draw the same inward towards the core and thereby form a unitary sub-assembly. Fixed on each rod is a lateral projecting collar 20. The rods are positioned around the core so that the collars 20 are located near the same side of the core. The collars will serve as stops as hereinafter described to prevent withdrawal of the rods from the transducer unit.

Associated with the core sub-assembly is a plate or disc 22 of insulating material, such as that known in the trade as "Bakelite," which is preferably circular in form as shown and has an outer diameter slightly greater than that of the core. The disc may have a central hole 24 as shown in Fig. 1. Circularly disposed around the outer margin of the disc are a plurality of small apertures 26 corresponding in number and position to the pins 14. The pins are inserted through the holes 26 until the stops 20 thereon abut the plate 22, thereby completing the sub-assembly. The pins project through the apertures 26 and beyond the disc as shown in Fig. 2 when the core is in abutting engagement with the plate.

An important member of the transducer is the cover or cap identified by a reference character 23. The cap has a cup-shape formation and may be a conventional cap designed for closing the discharge ends of bottles. The cap has a circular side wall 30 and a closed end wall 32. In the interior of the cap there is provided a gasket 34 which may be formed of soft indentible material such as cork, paper and the like. The cap is of a size as to receive the core sub-assembly. When the core assembly is placed inside the cap the pins 14 are pushed into the gasket material and gripped by the same as indicated in Fig. 2. In this way the pins are substantially immovably held in the position assumed by them in the assembly. Prior to this assembly operation the core and its windings may be tested to determine if they are in proper operating condition. The complete assembly of the parts is shown in Fig. 2 and it is evident that the disc 22 forms the outer closure member for the assembly. Preferably, the side wall 30 of the cap is slightly conical or flared so that when the disc is inserted therein it is wedged against the wall and tightly gripped therein.

In the final assembled condition the pins 14 of the transducer unit project from the disc 22 and are now ready for insertion in a socket or other means for electrically connecting them into circuits. The unit is shown in Fig. 2 as mounted upon a panel 36, on one side of

which are printed circuits 38. Holes are formed in the panel as indicated at 40 for receiving the projecting ends of the pins. Thus, in the mounted position of the unit, the pins project through the holes and into engagement with the printed circuitry on the opposite side of the panel.

Figs. 3 and 4 illustrate a modification of the invention wherein the transducer is provided with means permanently sealing the core assembled therein. Also shown in this modification is an arrangement for holding the pins or rods against rotation about their respective axes. For hermetically-sealing the transducer the disc 42 which corresponds to that described shown at 22 in Figs. 1 and 2 is not provided with a central aperture. It is also of such a circular dimension that it may be pressed into the cap 44 further than the disc 22 of Figs. 1 and 2. In this manner, it is recessed inwardly from the outer free edge of the cap and forms a clearance between the same and the panel upon which the cap is mounted. Into this clearance any suitable wax 45 may be flowed which will seal the disc in place and the holes through which the pins project.

To keep the pins from rotating on their axes, and possibly breaking their connections to the windings, it is preferred to provide each pin with a lateral bend. In the modification illustrated in Figs. 3 and 4 each pin 46 is provided with a bend 48 which may be of the "V-shape" shown. The V bend lies between the inner and outer tapes 50 and 52 and relatively tangential to the core 54. Each V bend forms a lateral extending arm for its pin which is restrained by the tapes and also the adjacent walls of the core and cap from lateral swinging movement. This holds the pins from angular movement about their respective axes.

As a result of this invention, there is provided a compact light-weight transducer unit which is constructed in a novel manner to employ a bottle cap type of case for the enclosure and to eliminate, if desired, the employment of an encapsulating medium to hold the parts from movement. The parts are formed into a sub-assembly which may be tested before installation in the enclosure cap. Novel means is provided for holding or locking the projecting pins against movement which might break their connections to the windings or disturb the sensitivity of the unit. Such means may comprise a penetrable layer on the underside of the cap which is indented by the pins and the provision of a lateral projection on each pin which is clamped between surfaces of adjacent parts of the assembly.

What is claimed is:

1. A transducer unit comprising a sub-assembly including a ring type magnetic core having at least one winding thereon and a plurality of electrically conductive pins electrically connected to the windings and disposed in closely surrounding relation to the core with each pin extending in substantially parallel relation to the axis of the core, a cup-shaped member enclosing the sub-assembly, said member having a penetrable substance of electrically non-conductive material in the interior thereof into which the pins of the sub-assembly are imbedded, means on said pins abutting said core and coacting with said penetrable substance to hold the same against movement, and means hermetically sealing said cup-shaped member against the atmosphere.

2. In combination, a sub-assembly including a ring type magnetic core having an axis and further having at least one winding thereon and a plurality of electrically-conductive pins circularly disposed about the core and electrically connected to the windings thereon, said pins extending substantially parallel to the axis of the core and projecting beyond the opposite sides of the core, a cup-shaped member closed at one end and open at the other end, said member enclosing the core sub-assembly so that one end of each of the pins is brought up near to the closed end of the cup-shaped member, a layer of pen-

trable non-conductive substance overlying the inner face of the closed end of the member and being indented by the adjacent ends of the pins to hold the same from movement, and electrically non-conductive means supportingly engaging the opposite ends of said pins and closing said open end of said cup-shaped member.

3. In combination, a sub-assembly including a ring type solid magnetic core having a central axis and at least one winding thereon and a plurality of electrically conductive pins circularly disposed about the core and electrically connected to the windings thereon, said pins extending substantially parallel to the axis of the core and projecting beyond the opposite sides of the core, a cup-shaped member closed at one end and open at the opposite end, said member enclosing the core sub-assembly so that one end of each of the pins is brought up close adjacent to the closed end of the cup-shaped member, a layer of penetrable non-conductive substance overlying the inner face of the closed end of the member and being indented by the adjacent ends of the pins to hold the same from movement, and a plate of insulating material fitted on the opposite ends of the pins and wedgingly engaged with the open end of the cup-shaped member to hold the sub-assembly in place therein.

4. A transducer unit comprising, in combination, a relatively rigid cup-shaped member of insulative material closed at one end and open at the other end, a layer of non-conductive indentible material on the inner surface of the closed end of the member, a magnetic core assembly received in the cup-shaped member having a plurality of conductive pins with their axes extending parallel to that of the core and projecting from the open end thereof, the inner ends of said pins being imbedded in said layer and restrained from movement thereby, and electrically non-conductive closure means for the open end of the cup-shaped member having openings therein for receiving the opposite ends of said pins.

5. In combination, a sub-assembly including a ring type magnetic core having a central axis and at least one winding thereon, a plurality of electrically conductive pins positioned adjacent to one of the peripheral surfaces of the core and projecting from the core, a casing enclosing the sub-assembly and having a layer of penetrable non-conductive substance on an inner face thereof, one end of each of said pins being imbedded in the layer to hold the same from movement relative to the core, a lateral projection on each of said pins forming an arm, means in the casing restraining each of said arms from movement to hold its respective pin from rotation about its axis, and an electrically non-conductive closure member for said casing adapted to receive and secure the projecting ends of said pins.

6. A transducer unit comprising, in combination, a relatively rigid generally circularly cup-shaped member having a central axis and closed at one end and opened at the other end, a layer of indentible non-conductive material on the inner surface of the closed end of the member, a magnetic core assembly received in the cup-shaped member and including a ring-shaped core and a plurality of electrically conductive pins circularly disposed about the core and projecting from the opposite sides of the core and substantially parallel to the axis of the cup-shaped member, the inner end sections of the pins being imbedded in the layer of indentible material and restrained from movement thereby, the opposite outer end sections of the pins projecting from the opened end of the cup-shaped member, and a disc of insulating material apertured so as to be fitted on the outer projecting ends of the pins, said disc being so dimensionally proportioned as to be wedgingly engaged with the opened end of the cup-shaped member to hold the magnetic core assembly in place therein.

7. A transducer unit comprising, in combination, a relatively rigid housing member, a magnetic core assembly received in the housing member and including a ring type

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core and a plurality of electrically conductive pins surrounding the core with their axes extending parallel to that of the core, each of said pins having a lateral extension offset to one side of the longer dimension thereof, said lateral extensions being substantially rigidly confined between the core and the side wall of the housing member, and electrically non-conductive means engaging opposite ends of said pins thereby to prevent the displacement of the core with respect to the housing member.

8. A magnetic core assembly comprising a ring type core having an axis, electrically insulating material surrounding said core, a plurality of electrically conductive pins circularly disposed about the core with their axes extending substantially parallel to the axis of the core, each of said pins being deformed to provide a lateral extending protrusion, a member of electrically non-conductive material surrounding the pins and confining the protrusions of the pins between the same and the core to restrain the pins from rotation about their respective axes, and means on each pin engaging the peripheral edge portion of the core and coacting with the confining member thereby to prevent withdrawal or removal of said pins from the assembly.

9. A magnetic core assembly comprising a substantially circular type magnetic core, dielectric material surrounding the core, a plurality of electrically conductive pins circularly disposed about said core and extending in substantially parallel relation to the axis of the core, each of said pins being shaped to provide an extension which is laterally offset with respect to the axis of the pin, a member of electrically non-conductive material surrounding the pins and confining the lateral extensions of the pins between the same and the core to restrain the pins from rotation about their respective axes, and separate electrically non-conductive means engaging opposite ends of each of each one of said pins thereby to substantially rigidify said assembly.

10. A transducer unit comprising, in combination, a relatively rigid cup shaped member of electrically insulative material, a magnetic core assembly received within

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the cup shaped member, said magnetic core assembly including a plurality of windings wound therearound, dielectric material disposed on said core, a plurality of electrically conductive pins positioned in circularly spaced relationship adjacent to the outer periphery of the core and between the same and the inner side wall of the cup shaped member, said pins each having a portion of its extent laterally offset to one side thereof and disposed adjacent to the outer periphery of the core, a tape-like element of insulated material wound around the pins and the laterally offset portions thereof and hugging the same against the outer periphery of the core, said pins being electrically connected to said windings and having extensions projecting through and beyond the open end of the cup shaped member, and a closure member provided with a plurality of apertures corresponding in number to said pins and adapted to maintain the pins in circularly spaced apart relation.

11. In combination, a sub-assembly including a ring type magnetic core having a central axis and a plurality of windings thereon, a plurality of electrically conductive pins disposed around the outer peripheral edge of the core and electrically connected to the windings, said pins projecting from the core, a casing enclosing the sub-assembly and having a layer of penetrable electrically non-conductive substance on an inner surface thereof, one end of each of said pins being imbedded in the layer to hold the same from movement relative to the core, and electrically non-conductive means coacting with said casing engaging the opposite ends of each one of the pins.

References Cited in the file of this patent

UNITED STATES PATENTS

2,154,070	Franz	Apr. 11, 1939
2,355,611	Veley	Aug. 15, 1944
2,392,701	Sanders	Jan. 8, 1946
2,535,203	Guthman	Dec. 26, 1950
2,569,468	Gaugler	Oct. 2, 1951
2,732,529	Reid et al.	Jan. 24, 1956