

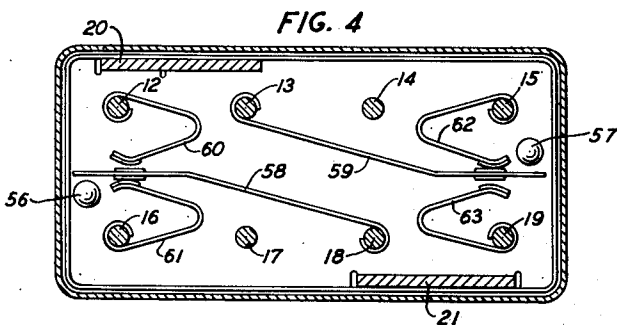
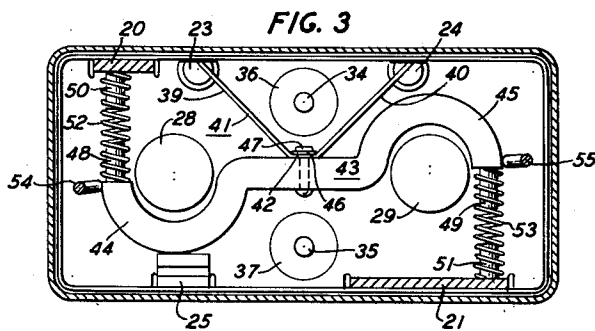
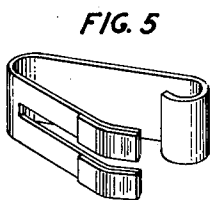
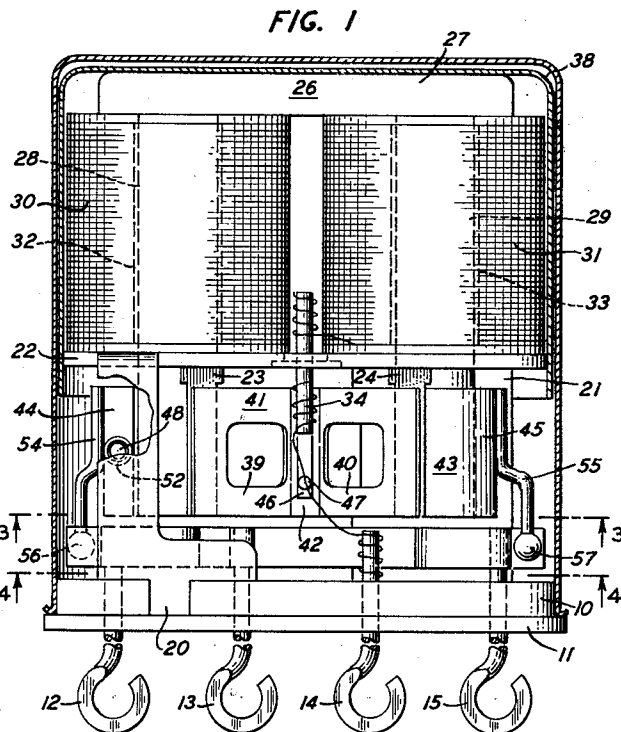
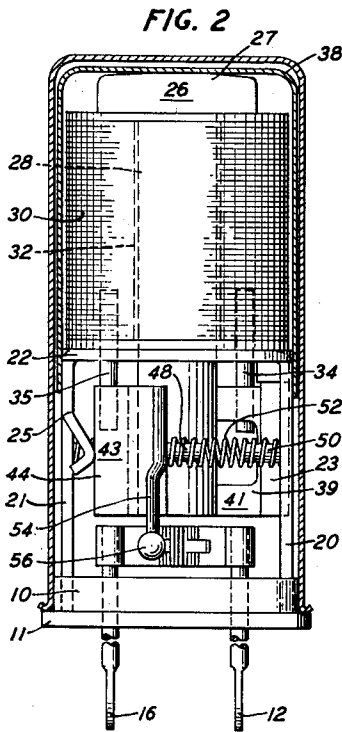
July 3, 1962

A. C. KELLER ET AL

3,042,773

RELAY

Filed Dec. 19, 1958



A. C. KELLER
R. L. PEEK, JR.
C. SCHNEIDER
C. F. SPAHN, JR.
INVENTORS
BY *John C. Morris*
ATTORNEY

1

3,042,773

RELAY

Arthur C. Keller, Bronxville, and Robert Lee Peek, Jr., New York, N.Y., and Charles Schneider, Chatham, N.J., and Charles F. Spahn, Jr., Roslyn Heights, N.Y., assignors to Bell Telephone Laboratories, Incorporated, New York, N.Y., a corporation of New York
Filed Dec. 19, 1958, Ser. No. 781,568
11 Claims. (Cl. 200—104)

This invention relates to an electromagnetic switching device and in particular to a relay of high reliability.

Reliability has always been a requisite for relays, but with the utilization of relays in complex electronic systems that either function correctly or fail entirely, reliability has become more important than ever before. Furthermore, because these electronic systems are frequently subject to shock, vibration, sustained linear acceleration and wide variations in temperature, the desired reliability must be maintained even under these circumstances.

Relays presently available suffer from various defects that cause unreliable performance. The frictional effects inherent in conventional armature bearings produce erratic armature operation. The organic insulating materials used to insulate the relay operating coils contaminate the relay contacts, causing unreliable contact performance. Inefficiently designed magnetic circuits limit the sensitivity of the relay and produce magnetic interference in and allow magnetic interference from other nearby relays.

An object of this invention is to provide a relay with a high degree of reliability even when subjected to severe circumstances.

More specifically, an object of the invention is to provide an armature support that assures consistent armature alignment and reliable performance throughout the life of the relay.

Another object of the invention is to provide a contact enclosure that is free of contaminating organic material.

A further object of the invention is to provide a magnetic circuit designed for optimum sensitivity and minimum magnetic interference.

A still further object of the invention is to provide increased contact reliability.

These and other objects of the present invention are realized in an illustrative embodiment thereof wherein the relay comprises a balanced armature rotatively mounted to the apex of a V-shaped metal hinge. The armature has cylindrical pole faces that are positioned in juxtaposition with opposite sides of cylindrical poles of a one-piece U-shaped core. The pole faces are normally maintained a spaced distance from the poles by two armature-restoring springs and a stop.

Attached to the periphery of each pole face is a contact actuator, the end of each actuator being disposed adjacent to a transfer contact member. Positioned on both sides of each transfer contact member are V-shaped, bifurcated make and break contact members. Normally, each transfer contact member is in contact with a break contact member and a spaced distance from a make contact member.

Respectively disposed about the portions of the core legs above the poles and enclosed in a hermetically sealed chamber are two series connected windings. When the operating coils are energized, the armature pole faces are attracted to the poles. The rotation of the armature causes the contact actuators to engage the transfer contact members and close them with the make contact members. On de-energization of the windings, the armature-restoring springs return the armature to its normal position, allowing the transfer contact members to move

2

from the make contact members to the break contact members.

Accordingly, a feature of the invention resides in rotatively supporting an armature by means of a V-shaped hinge to eliminate friction and wear products that tend to cause erratic operation of the armature.

Another feature of the invention is found in enclosing relay windings in a hermetically sealed chamber to isolate contaminating organic insulating materials from circuit making and breaking elements.

A further feature of the invention resides in utilizing an armature having cylindrical pole faces in conjunction with a one-piece U-shaped core having cylindrical poles to obtain uniform magnetic characteristics, optimum sensitivity and minimum magnetic interference.

A still further feature resides in bifurcating make-and-break contact members to improve contact reliability.

A complete understanding of the invention and of these and other features and advantages thereof may be gained from consideration of the following detailed description taken in conjunction with the accompanying drawing wherein one embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawing is for the purposes of illustration and description and is not to be construed as defining the limits of the invention.

In the drawing:

FIG. 1 is a front elevation of the relay of this invention with the inner and outer covers in section;

FIG. 2 is a side elevation of the relay of this invention with the inner and outer covers in section;

FIG. 3 is a horizontal section of the relay shown in FIG. 1 taken along the line 3—3 and looking in the direction of the arrows;

FIG. 4 is a horizontal section of the relay shown in FIG. 1 taken along the line 4—4 and looking in the direction of the arrows; and

FIG. 5 is a perspective view of a make or break contact member.

Referring to FIG. 1 and 4 of the drawing, the relay of this invention comprises a header 10 having a flange portion 11. Extending through the header at spaced intervals are terminals 12, 13, 14, 15, 16, 17, 18, and 19. The terminals are embedded in glass seals (not shown) that secure the terminals to and electrically insulate the terminals from the header. The header may be formed of any suitable material such as cold rolled steel, while the terminals should be made from a material having a coefficient of expansion approximating that of the glass. An alloy of 52% nickel and 48% iron has been found satisfactory.

As shown in FIGS. 1 and 2, side members 20 and 21 are secured to two opposed edges of the header 10 and extend perpendicularly therefrom. An oblong separating plate 22, of proportionate but slightly smaller dimensions than the header, is secured to the side members and extends in a plane parallel to the header. Affixed along one longitudinal edge of the separating plate are hinge support members 23 and 24, while secured along the other longitudinal edge is a stop member 25. The stop and supporting members extend perpendicularly from the separating plate toward the header. The combination of side members, separating plate, support members and stop member form the frame of the relay. They may be individual elements or they may be integrated into a single unit that is advantageously fabricated from a nonmagnetic, corrosion-resistant material such as nickel silver.

A U-shaped member 26 having a flattened yoke portion 27 and cylindrical legs 28 and 29 serves as the relay

3

core. The core is preferably fabricated from a material, such as permalloy, which has a high permeability and low hysteresis loss. In addition, it is preferably fabricated design eliminates joints and air gaps in the magnetic path and thereby provides increased sensitivity and uniform magnetic characteristics. In fabricating the core, the bar may be bent to the shape of a U and then crimped in a die press to provide the space saving flattened yoke.

Windings 30 and 31, respectively wound upon spools 32 and 33, are connected in series or in parallel and placed about the portions of the legs 28 and 29 adjacent the yoke 27. The legs are then hermetically secured to the separating plate 22 by any well-known means such as soldering, the end of the legs extending through longitudinally spaced apertures in the plate.

Extending through transversely spaced apertures in the separating plate 22 are conductor pins 34 and 35, the upper ends of which are electrically connected to the end lead wires of the windings 30 and 31. The pins are respectively mounted within glass seals 36 and 37, and the glass seals are encompassed by metallic sleeves (not shown) that hermetically secure the seals to the separating plate. The glass seals electrically insulate the conductor pins from the plate.

An inner cover member 38 affixed to the separating plate 22 hermetically encloses the windings and the upper portions of the core and conducting pins. The chamber formed by the inner cover and the separating plate is preferably filled with an epoxy resin (not shown) through an opening in the inner cover (not shown) that is later hermetically sealed. The resin immobilizes the winding leads thereby eliminating possible failures in electrical connections due to vibration and fatigue.

Referring now to FIGS. 1, 2 and 3, the legs 39 and 40 of a V-shaped hinge 41 are secured to beveled surfaces on the hinge support members 23 and 24. The hinge is fabricated from a material which, like stainless steel, has an acceptable endurance limit for reverse bending. Apertures are preferably formed in the hinge to reduce stress therein.

Mounted to a flattened apex 42 of the hinge is an armature 43. The armature has a modified S shape, the balanced, curved ends of the armature having cylindrical pole faces 44 and 45. The pole faces are disposed on opposite sides of the longitudinal axis of the armature, and they are positioned in juxtaposition with opposite sides of the pole face portions of the core legs 16 and 17. The armature is fabricated from a material which, like permalloy, has a high permeability and low hysteresis loss. The curved ends of the armature may be formed by swaging, and the concave surfaces are advantageously chromium plated.

In the process of mounting the armature to the apex of the hinge, a spacer 46 is placed opposite to the armature and the legs of a U-shaped staple 47 are passed through apertures in the spacer, hinge, and armature. The ends of the legs of the staple are then upset, riveting the armature to the hinge.

Although not shown, the armature 43 may be further supported by a second V-shaped hinge positioned diametrically opposite to the hinge 41 by means of two additional hinge support members.

The mating cylindrical pole faces of the armature and core legs act to provide a magnetic structure of optimum sensitivity, and when the core is magnetized the armature rotates about its center, flexing the hinge legs 39 and 40. The relative motion between parts found in conventional bearings and the friction and wear products resulting therefrom are avoided, providing consistent armature alignment and reliable performance throughout the life of the relay. Furthermore, while the V-shaped hinge permits the armature to rotate, it restricts translatory motion resulting from shock, vibration and sustained linear acceleration.

Attached to the ends of the pole faces 44 and 45 are

4

spring guide pins 48 and 49 which are axially aligned with and a spaced distance from spring guide pins 50 and 51 affixed to the frame members 20 and 21. Armature-restoring compression springs 52 and 53 disposed about the guide pins bias the armature (as viewed in FIG. 3) in a counterclockwise direction. The stop member 25 acts in conjunction with the armature-restoring springs to normally maintain the pole faces a spaced distance from the poles. The restoring springs minimize armature motion that might be induced by external forces and reduce armature rebound upon de-energization of the relay.

Mounted in the armature 43 symmetrically with respect to its axis of rotation are contact actuators 54 and 55. One end of each is secured to the armature by any suitable method such as spot welding. The opposite ends of the actuators are provided with electrical insulators such as glass beads 56 and 57.

As shown in FIG. 4, the glass beads 56 and 57 are respectively situated adjacent transfer contacts 58 and 59. The transfer contact 58 extends between make contact 60 and break contact 61, while the transfer contact 59 extends between break contact 62 and make contact 63. The transfer contacts normally engage the break contacts and are a spaced distance from the make contacts.

The transfer contacts 58 and 59 are generally linear spring members having one end respectively secured to terminals 12 and 13. The make contacts 60 and 63 and the break contacts 61 and 62 are V-shaped spring members having the end of one arm respectively secured to terminals 12, 19, 16 and 15. As illustrated in FIG. 5, the unsecured arms of the make and the break contacts are bifurcated. By having two relatively independent contact faces, the possibility of a piece of lint or any other contaminate intervening between the contact face of either a make or break contact and a transfer contact is virtually eliminated, thereby improving contact reliability. To improve contact performance, the contact faces of both the transfer contacts and the make and the break contacts are made of gold or gold alloy.

The terminals 14 and 17, the two terminals not secured to contact members, are electrically connected to the lower portion of conductor pins 34 and 35, and thus carry the energizing current for the operating coils.

An outer cover member 64 affixed to the header 10 hermetically encloses the relay members. The chamber formed by the outer cover and the header is preferably filled with an inert gas through an opening in the header (not shown) which is later hermetically sealed.

In the operation of the relay, energization of windings 30 and 31 generates magnetic flux in the cylindrical legs 28 and 29 of the core 26, attracting cylindrical pole faces 44 and 45. The armature 43 is thereby rotated causing the contact actuators 54 and 55 to respectively engage the transfer contacts 58 and 59 and to close them with make contacts 60 and 63.

Upon de-energization of the operating coils, the armature-restoring springs 52 and 53, in conjunction with the stop 25, return the armature to its normal position, whereby the cylindrical pole faces are a spaced distance from the cylindrical poles. The contact actuators are thereby disengaged from the transfer contacts allowing the transfer contacts to move from the make contacts to the break contacts 61 and 62.

Although but one embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit and scope of the invention as the same will now be understood by those skilled in the art.

What is claimed is:

1. A relay comprising in combination a separating plate having a first and second side, a header secured parallel

to and a spaced distance from the first side of said separating plate, a one-piece U-shaped core secured to said separating plate so that the base and a portion of the legs are on the second side of said operating plate while the remaining portion of the legs extend through said separating plate toward said header, said core legs having circular cross section, a pair of windings respectively disposed about the portion of said core legs on the second side of said separating plate, a pair of spaced pin conductors secured to said separating plate and extending in both directions therefrom, said pin conductors being electrically insulated from said separating plate, the end leads of said windings being electrically connected to the portion of said pin conductors on the second side of said separating plate, an inner cover member affixed to said separating plate hermetically enclosing said winding and the portions of said core and said pin conductors on the second side of said separating plate, a pair of hinge supports attached to said separating plate and extending normally therefrom toward said header, said hinge supports having beveled faces, a V-shaped spring hinge having its ends secured to the beveled faces of said hinge supports, a balanced armature affixed at its center to the apex of said spring hinge, the ends of said armature having cylindrical pole faces, said spring hinge positioning said pole faces in juxtaposition with opposite sides of the portion of said core legs extending on the first side of said separating plate, first spring guide pins attached to the ends of said armature, second spring guide pins attached a spaced distance from and axially aligned with said first guide pins, armature-restoring compression springs disposed about said first and second spring guide pins, said armature-restoring spring normally biasing said pole faces away from said core legs, a stop member secured to said separating plate and extending therefrom toward said header, said stop member positioned adjacent the periphery of one of said pole faces, said stop member in combination with said armature-restoring springs normally maintaining said pole faces a spaced distance from said core legs, a plurality of terminals extending through said header and electrically insulated therefrom, some of said terminals being electrically connected to the portion of said conductor pins on the first side of said separating plate, a plurality of V-shaped spring make and break members having the end of one arm of the V secured to some of said terminals, said spring members positioned so that an unsecured arm of one spring make member is in juxtaposition with an unsecured arm of one spring break member, said unsecured arms being bifurcated, a plurality of spring transfer members having one end secured to other of said terminals, the unsecured ends of said spring transfer members extending between the unsecured juxtaposed arms of said spring make and break members, said transfer members being normally in contact with said break members and a spaced distance from said make members, gold contact faces affixed to the unsecured ends of said spring make and break members and said spring transfer members, contact actuating members symmetrically mounted on said armature and engaging said spring transfer members, and an outer cover member affixed to said header hermetically enclosing the relay.

2. A relay comprising in combination a separating member having a first and second side, a header secured parallel to and a spaced distance from the first side of said separating member, a one-piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said header, said core legs having a cylindrical cross section, a plurality of windings disposed about the portion of said core legs on the second side of said separating member, a plurality of spaced pin conductors secured to said separating member and extending in both directions therefrom, said pin conductors being electrically insulated from said separating

member, said windings being electrically connected to the portion of said pin conductors on the second side of said separating member, an inner cover member affixed to said separating member hermetically enclosing said windings and the portions of said core and said pin conductors on the second side of said separating member, a pair of hinge supports attached to said separating member and extending therefrom toward said header, said hinge supports having beveled faces, a V-shaped spring hinge secured to the beveled faces of said hinge supports, a balanced armature affixed at its center to the apex of said spring hinge, the ends of said armature having cylindrical pole faces, said spring hinge positioning said pole faces in juxtaposition with opposite sides of the portion of said core legs extending on the first side of said separating member, first spring guide pins attached to the ends of said armature, second spring guide pins positioned a spaced distance from and axially aligned with said first spring guide pins, armature-restoring springs disposed about said first and second spring guide pins, said armature-restoring springs normally biasing said pole faces away from said core means, a stop member secured to said separating member and extending therefrom toward said header, said stop member positioned adjacent the periphery of one of said pole faces, said stop member in combination with said armature-restoring springs normally maintaining said pole faces a spaced distance from said core means, a plurality of terminals extending through said header and electrically insulated therefrom, the portion of said conductor pins on the first side of said separating member being electrically connected to some of said terminals, a plurality of V-shaped spring make and break contacts having the end of one arm of the V secured to some of said terminals, said spring contacts positioned so that an unsecured arm of one spring make contact is in juxtaposition with an unsecured arm of one spring break contact, said unsecured arms being bifurcated, a plurality of spring transfer contacts having one end secured to other of said terminals, the unsecured ends of said spring transfer contacts extending between the unsecured juxtaposed arms of said make and break spring contacts, said transfer contacts normally being in contact with said break contacts and a spaced distance from said make contacts, contact actuating members symmetrically mounted on said armature and engaging said spring transfer contacts, and an outer cover member affixed to said header hermetically enclosing the relay.

3. A relay comprising in combination a separating member having a first and second side, a header secured generally parallel to and a spaced distance from the first side of said separating member, a one-piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said header, said core legs having a circular cross section, a plurality of windings disposed about the portion of said core legs on the second side of said separating member, a plurality of conductor members secured to said separating member and extending in both directions therefrom, said conductor members being electrically insulated from said separating member, said windings being electrically connected to the portion of said conductor members on the second side of said separating member, an inner cover member affixed to said separating member hermetically enclosing said windings and the portions of said core and said conductor members on the second side of said separating member, a plurality of hinge supports attached to said separating member and extending therefrom toward said header, a V-shaped spring hinge secured to said hinge supports, a balanced armature affixed at its center to the apex of said spring hinge, the ends of said armature having cylindrical pole faces, said spring hinge positioning said pole faces in juxtaposition with opposite sides of the portion of said core legs extending on the first side of said

7

separating member, first spring guide members attached to the ends of said armature, second spring guide members positioned a spaced distance from and axially aligned with said first spring guide members, armature-restoring springs disposed about said first and second spring guide members, said armature-restoring springs biasing said pole faces away from said core legs, a plurality of terminals extending through said header and electrically insulated therefrom, the portion of said conductor member on said first side of said separating member being electrically connected to some of said terminals, a plurality of V-shaped make and break contacts having the end of one arm of the V secured to some of said terminals, said contacts positioned so that an unsecured arm of one make contact is in juxtaposition with an unsecured arm of one break contact, a plurality of transfer contacts having one end secured to other of said terminals, the unsecured ends of said transfer contacts extending between the unsecured juxtaposed arms of said make and break contacts, said transfer contacts normally being in contact with said break contacts and a spaced distance from said make contacts, contact actuating members symmetrically mounted on said armature and engaging said transfer contacts, and an outer cover member affixed to said header hermetically enclosing the relay.

4. A relay comprising in combination a separating member having a first and second side, a header secured generally parallel to and a spaced distance from the first side of said separating member, a one-piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said header, said core legs having a circular cross section, a plurality of windings disposed about the portion of said core legs on the second side of said separating member, conductor means secured to said separating member and extending in both directions therefrom, said conductor means being electrically insulated from said separating member, said windings electrically connected to the portion of said conductor means on the second side of said separating member, an inner cover member affixed to said separating member hermetically enclosing said winding and the portion of said core and said conductor means on the second side of said separating member, a plurality of hinge supports attached to said separating member and extending therefrom toward said header, a V-shaped hinge secured to said hinge supports, an armature affixed at its center to the apex of said hinge, the ends of said armature having cylindrical pole faces, said hinge positioning said pole faces in juxtaposition with opposite sides of the portion of said core legs on the first side of said separating member, means for biasing said pole faces a spaced distance from said core legs, a plurality of terminals extending through said header and electrically insulated therefrom, the portion of said conductor means on the first side of said separating member being electrically connected to some of said terminals, a plurality of make and break contacts secured to some of said terminals, a plurality of transfer contacts secured to other of said terminals and extending between said make and break contacts, said transfer contacts normally being in contact with said break contacts and a spaced distance from said make contacts, contact actuating members symmetrically mounted on said armature and engaging said transfer contacts, and an outer cover member affixed to said header hermetically enclosing the relay.

5. A relay comprising in combination a separating member having a first and second side, a header secured parallel to and a spaced distance from the first side of said separating member, a one-piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said

8

header, said core legs having a circular cross section, energizing means disposed about the portion of said core legs on the second side of said separating member, an inner cover member affixed to said separating member hermetically enclosing said energizing means and the portions of said core on the second side of said separating member, support means attached to said separating member and extending therefrom toward said header, a V-shaped hinge secured to said support means, an armature affixed at its center to the apex of said hinge, said armature having cylindrical pole faces disposed in juxtaposition with opposite sides of the portion of said core legs extending on the first side of said separating member, means for biasing said pole faces a spaced distance from said core legs, a plurality of terminals extending through said header and electrically insulated therefrom, said energizing means being electrically connected to some of said terminals, a plurality of make and break contacts secured to some of said terminals, a plurality of transfer contacts secured to other of said terminals and extending between said make and break contacts, said transfer contacts normally being in contact with said break contacts and a spaced distance from said make contacts, contact actuating members symmetrically mounted on said armature and engaging said transfer contacts, and an outer cover member affixed to said base member hermetically enclosing the relay.

6. A relay comprising in combination a separating member having a first and second side, a header secured generally parallel to and a spaced distance from the first side of said separating member, a one-piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member towards said header, said core legs having a circular cross section, energizing means disposed about the portion of said core legs on the second side of said separating member, means for hermetically enclosing said energizing means, a plurality of V-shaped hinges secured adjacent to the portion of said core legs on the first side of said separating member, an armature affixed at its center to the apex of said hinges, said armature having cylindrical pole faces disposed in juxtaposition with opposite sides of said core legs, a plurality of terminals extending through said header and electrically insulated therefrom, said energizing means being electrically connected to some of said terminals, a plurality of contacts secured to other of said terminals, said contacts having movable and stationary members, contact actuating members symmetrically mounted on said armature and engaging said movable contact members, and an outer cover member affixed to said header hermetically enclosing the relay.

7. A relay comprising in combination a separating member having a first and second side, a header secured parallel to and a spaced distance from the first side of said separating member, a U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said header, said core legs having a cross section of a particular configuration, energizing means disposed about the portion of the core legs on the second side of said separating member, means for hermetically enclosing said energizing means, a plurality of V-shaped hinges secured adjacent to the portion of said core legs on the first side of said separating member, an armature affixed at its center to the apex of said hinges, the ends of said armature shaped to conform to the configuration of said core legs, the ends of said armature further being disposed in juxtaposition with opposite sides of the core legs, a plurality of terminals extending through said header and electrically insulated therefrom, said energizing means being electrically connected to some of said terminals, a plurality of contacts secured to other of said terminals, said contacts having movable and sta-

9

tionary members, and contact actuating members symmetrically mounted on said armature and engaging said movable contact members.

8. A relay comprising in combination a separating member having a first and second side, a header secured parallel to and a spaced distance from the first side of said separating member, a one piece U-shaped core secured to said separating member so that the base and a portion of the legs are on the second side of said separating member while the remaining portion of the legs extend through said separating member toward said header, said core legs having a cross section of a particular configuration, energizing means disposed about the portion of the core legs on the second side of said separating member, a spring hinge secured adjacent to the portion of said core legs on the first side of said separating member, an armature affixed at its center to said hinge, the ends of said armature being shaped to conform to the configuration of said core legs, the ends of said armature further being disposed in juxtaposition with opposite sides of the core legs, switching means positioned on the first side of said separating member, said switching means adapted to be actuated by the movement of said armature, and enclosing means secured to said separating member and said header so as to form a hermetically sealed contact chamber about said switching means, said contact chamber being free of any organic materials.

9. A relay comprising in combination a separating member having a first and second side, a one piece U-shaped core secured to said separating member so that the base and a portion of the legs lie on the first side of said separating member while the remaining portion of the legs lie on the second side of said separating member, said core legs having a cross section of a particular configuration, energizing means disposed about the portion of the core legs on the first side of said separating member, a spring hinge secured adjacent to the portion of said core legs on the second side of said separating member, an armature affixed at its center to said hinge, the ends of said armature being shaped to conform to the configuration of said core legs, the ends of said armature further being disposed in juxtaposition with opposite sides of said core legs, switching means positioned on the second side of said separating member, said switching means adapted to be actuated by the movement of said armature, and enclosing means enclosing said switching means in a hermetically sealed contact chamber, said contact chamber being free of any organic materials.

10

10. A relay comprising in combination a separating member having a first and second side, a U-shaped core secured to said separating member so that the base and a portion of the legs lie on the first side of said separating member while the remaining portion of the legs lie on the second side of said separating member, said core legs having a cross section of a particular configuration, energizing means disposed about the portion of the core legs on the first side of said separating member, a spring hinge secured adjacent to the portion of said core legs on the second side of said separating member, an armature affixed at its center to said hinge, the ends of said armature being shaped to conform to the configuration of said core legs, the ends of said armature further being disposed in juxtaposition with opposite sides of the core legs, switching means adapted to be actuated by the movement of said armature, and enclosing means enclosing said switching means in a hermetically sealed contact chamber, said contact chamber being free of any organic materials.

11. A relay comprising in combination a one piece U-shaped core having legs of a particular cross sectional configuration, energizing means disposed about said core, a spring hinge secured adjacent to the legs of said core, an armature affixed at its center to said hinge, the ends of said armature being shaped to conform to the configuration of said legs, the ends of said armature further being disposed in juxtaposition with opposite sides of said legs, switching means adapted to be actuated by the movement of said armature and enclosing means enclosing said switching means in a hermetically sealed contact chamber, said contact chamber being free of any organic materials.

References Cited in the file of this patent

UNITED STATES PATENTS

1,167,067	Hill	Jan. 4, 1916
1,392,234	Tirrill	Sept. 27, 1921
1,886,372	Bossart	Nov. 8, 1932
2,764,656	Horlacher	Sept. 25, 1956
2,775,666	Lazich	Dec. 25, 1956
2,824,189	Zimmer	Feb. 18, 1958
2,871,312	Curry	Jan. 27, 1959
2,896,132	Sauer	July 21, 1959
2,933,572	Howell et al.	Apr. 19, 1960
2,976,379	Rhodes	Mar. 21, 1961