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Description

This invention relates to an electromagnetic relay of the type set forth in the first part of claim 1. Such a relay is known from EP—A—0 040 778.

In the known relay, a rectangular frame-shaped armature assembly surrounds the relay coil assembly and is pivoted about a transverse axis defined by a pair of studs formed on the coil assembly. The armature assembly is surrounded at its sides, ends and bottom by an insulating cover the bottom wall of which is provided with projections for actuating movable contact springs disposed below the coil and armature assemblies. While electrical isolation is achieved between the contact units and the coil, the disposition of the contact units below the remaining structural parts increases the overall height of the known relay, which is undesirable in certain applications, and it also renders the contact units prone to magnetical influence.

It is thus an object of the present invention to provide an electromagnetic relay which is thin in its vertical dimension and provides a magnetical shielding for the contact units.

This object is met by the invention defined in claim 1. The disposition of the contact unit or units laterally of the coil assembly in a space defined by the armatures and permanent magnets provides a magnetical shielding of the contacts and, at the same time, decreases the vertical dimension of the relay.

In the development of claim 2, since the bearing studs of the armature assembly are integral with the coil assembly, the positional relation between the armatures and the end portions of the core extending through the coil is reproducible with close tolerances. Substantially the same accuracy can be achieved in the development of claim 3 where the studs supporting the armatures are formed in a housing frame of the relay which positions the coil assembly.

A particularly effective sealing of the relay in an outer casing is obtained in the further development of the invention called for in claims 9 and 10, according to which the connecting surfaces between casing portions are large and a sealing agent accordingly spreads over a large area. In addition, if the individual casing portions should have different contraction rates, compression occurs between parts of the mutually engaging surfaces, thereby enhancing the sealing effect.

In a further advantageous development of the invention according to claims 11 and 12, when the casing portions are sealed together, insulation at the connecting parts of coil terminals is improved by a capillary action of the sealant, thereby improving the insulation between the coil and the contacts to increase the breakdown voltage of the relay.

Preferred embodiments will now be described with reference to the drawings in which

Fig. 1 is a perspective exploded view of a polarized, balanced armature type relay,

Fig. 2 is a plan view of the relay of Fig. 1 in its

assembled condition with the upper cover and upper armature removed,

Fig. 3 is a sectional view of the relay taken along the line A—A of Fig. 2 with the lower armature and lower cover also omitted,

Fig. 4 shows a vertical section through the coil and armature assemblies and the movable contact springs to show the positional relation between these elements,

Fig. 5 is a detailed view of a fixed contact of the relay,

Fig. 6 is a cross-sectional view through the relay showing a part of the casing and coil assembly,

Fig. 7 shows another cross-section through the casing of the relay,

Fig. 8 is a perspective exploded view similar to Fig. 1 of a modified balanced armature type polarized relay,

Fig. 9 is a perspective exploded view of the lower armature and one permanent magnet for explaining another mode of interconnecting these elements in the relays according to Figs. 1 and 8,

Fig. 10 is a side view of the pair of armatures and the permanent magnets according to the embodiment of Fig. 9, shown during assembly,

Fig. 11 is a perspective exploded view of the coil and armature assemblies according to another embodiment of the invention, and

Fig. 12 is a side view of the coil and armature assemblies of Fig. 11, shown in the assembled condition.

The relay shown in Figs. 1 to 7 comprises a casing 1 including a rectangular frame member 11 and upper and lower covers 9 and 10. As shown in detail in Fig. 7, the lower rim of the upper cover 9 and the upper rim of the lower cover 10 are each provided with a groove 19, and projecting ridges 13 fitting into the grooves 19 are provided on the top and bottom edges of the frame 11. The contact surfaces between the frame 11 and each of the covers 9 and 10 is thus rather large, thus providing a large area over which sealant 53 can spread. If there is a difference in the contraction rates between the frame 11 and the covers 9 and 10, either of the side surfaces of the ridge 13 will be inevitably subjected to compression by the corresponding surface of the groove 19, thereby enhancing the sealing effect. Rather than forming ridges 13 on the frame 11, as shown in Fig. 7, it is also possible to provide ridges on the covers 9 and 10 and corresponding grooves in the frame 11.

As best seen in Figs. 1 to 3, the frame 11 carries a pair of movable contact springs 6 and fixed contacts 8, the free end of each spring 6 having a contact portion 7 for cooperation with the respective fixed contact 8.

A plurality of terminals 14 is embedded in the frame 11, each terminal 14 having a connecting portion extending to the outside of the frame 11, and an inner connecting portion for engagement with a corresponding connecting portion of the coil and contacts. Two of these inner connecting portions 51 of two corresponding terminals 14 are shown in Fig. 1.

A coil assembly generally referenced by numerical 2 includes a coil 20 wound on a bobbin 22 and an iron core 21 extending through the bobbin and coil. End portions of the core 21 extend to the outside at both ends of the bobbin 22 and are each provided with a recess 25. The coil 20 is covered by a molded casing 23, and in applying this molded casing, the core 21 is held at the upper and lower surfaces of the core end portions, and molded casing 23 being formed integrally with a pair of studs 24 projecting laterally from both sides of the coil 20. By this process, high positional accuracy between the end portions of the core 21 and the studs 24 is ensured inspite of the fact that the studs 24 are disposed on the outer periphery of the coil 20.

The coil assembly 2 is inserted into the frame 11 in fitting projections 12 formed at the inner surfaces of the frame 11 into the grooves 25 at the end faces of the core end portions. This structure improves the mechanical strength of the frame 11 by using the iron core 21 as a central portion thereof.

As further shown in Fig. 1, upper and lower armatures 3, 4 of flat, rectangular frame-shape are provided. A rectangular frame-like balancing spring 35 is mounted on the upper surface of the upper armature 3. A pair of permanent magnets 5 is disposed at opposite sides on the upper surface of the lower armature 4, each magnet 5 being located between a pair of connecting pins 41 extending from the lower armature 4. The lower surface of the upper armature 3 and the upper surface of the lower armature 4 are provided with integrally formed actuating noses 31 disposed opposite each other at an end of respective edges of the armatures. Bearing members 30 are provided at the centers of both sides of both armatures 3, 4 at the inner edges of their frame-shapes so as to project upwardly from the lower armature 4 and downwardly from the upper armature 3.

In assembling, the armatures 3, 4 are disposed so as to surround the coil assembly 2, which itself has been mounted in the frame 11. The connecting pins 41 projecting upwardly from the lower armature 4 are fitted into bores 32 in the upper armature 3 thereby connecting the two armatures 3, 4 so that they are maintained parallel to each other. At the same time, the two pairs of upper and lower bearing members 30 provided at both armatures 3, 4 sandwich the pair of studs 24 extending from the molded casing 23 of the coil assembly 2, and the pair of permanent magnets 5 abut with their upper surfaces against the lower surface of the upper armature 3. The thus completed armature assembly is supported for pivotal movement about the horizontal axis defined by the pair of studs 24. The contact springs 6 are sandwiched between the opposing actuating noses 31 provided at the inner surfaces of the upper and lower armatures 3, 4. Also, the contact units formed by the contact springs 6 and the fixed contacts 8 are disposed within a shielded space S enclosed by the permanent magnets 5

and the upper and lower armatures 3, 4 as shown in Fig. 4. Thus, the coil 20 and the contact units are magnetically shielded from each other so that surges from the contact side (output side) are prevented from influencing the coil side (input side), in other words, the electronic circuit at the input side is protected against being damaged by surges occurring at the output side in Fig. 4, the molded portion 23 of the coil assembly 2 is not shown.

After the coil assembly 2 has been inserted in the frame 11 and the armature assembly has been completed around the coil assembly and the contact units, the casing is closed by placing the upper and lower covers 9, 10 on the respective edges of the frame 11 with sealant being disposed between the contacting surfaces of these casing portions as explained above.

As shown in Fig. 1, the coil 20 has its wire ends connected to coil connecting portions 50 which project laterally from the ends of the core 21 extending from the coil. In the embodiment shown, a double-coil has been assumed, so that there are four coil connecting portions 50. When the coil assembly 2 is inserted into the frame 11, these coil connecting portions 50 come into engagement with portions 51 which are the inner ends of terminals 14. The engaging condition between these connecting portions 50 and 51 is shown in detail in Fig. 6.

As is also indicated in Figs. 1 and 6, ribs 52 are formed integrally with said upper and lower covers 9, 10 so as to project inwardly with each rib 52 of the upper cover 9 facing a corresponding rib of the lower cover 10 at a position corresponding to the connecting portions 50 and 51. When the casing 1 is closed and the casing portions 9, 10 and 11 are bonded together by means of the sealant 53, the inner ends of the ribs 52 come in close proximity to the respective outer surfaces of the connecting portions 50, 51, and the gap therebetween is filled with the sealant due to capillary action. The insulation between the coil 20 and the contact terminals 14 is thus improved, and the breakdown voltage is increased without increasing the overall number of component parts of the relay or the number of steps in the process of manufacturing and assembling such relay.

In operation of the relay, when voltage is applied to the coil 20 to magnetize the upper and lower surfaces (pole faces) at both projecting ends of the iron core 21, magnetic attractive and repulsive forces are created between the ends of the core and the corresponding ends of the armatures 3, 4 which are magnetized by the permanent magnets 5. The armature assembly is thereby caused to pivot about the axis defined by the studs 24, thereby driving the contact springs 6 sandwiched between the actuating noses 31 into or out of engagement with the corresponding fixed contacts 8, respectively.

Adjustment of the switching characteristics of the relay by positioning the fixed contacts 8 will now be explained with reference to Figs. 2, 3 and

5. Each fixed contact 8 is mounted on a plate 15 which has a pair of lugs 16 projecting from both sides at the central portion of the plate 15, as specifically shown in Fig. 2. These lugs 16 are embedded in a portion of the frame 11 and connected to a respective one of the terminals 14. The fixed contact 8 is mounted at a front end of the plate 15 at a position in which it opposes the contact portion 7 provided on the contact spring 6, whereas the rear end of the plate 15 projects beyond the tip of the spring 6. As shown in Fig. 3, an adjusting tool 17 may be used to press on the rear end of the plate 15 from above or below to rotate the plate 15 about a horizontal axis defined by the lugs 16 thereby varying the vertical position of the fixed contact 8, as shown in Fig. 5.

As will be appreciated from the above description, the studs 24 supporting the armature assembly are integral with the molded caring 23 covering the coil 20 so that the iron core 21 penetrating through the coil 20 and the studs 24 are in a fixed position relatively to each other and form a common block to be conveniently assembled and inserted into the relay frame 11. The relative position between the upper and lower surfaces provided at both ends of the iron core 21, which serve as the pole faces, and the end surfaces of the armatures 3 and 4 cooperating with these pole faces is thus reproduced with high accuracy, so that stable relay characteristics are obtained. Moreover, the pair of armatures 3, 4 and the contact units 6 are disposed at the lateral sides of the coil 20, so that the vertical dimension of the entire mechanism may be restricted to the height of the coil 20. Accordingly, a relay of thin structure is devised, without imposing restrictions on the coil design which may thus be wound with maximum efficiency. In addition, since the coil is covered by the molded caring 23, the contacts 7, 8, are not affected by gases or moisture from the coil winding.

The modified embodiment of the invention shown in Fig. 8 differs from that described above in that the bearing members 30 are formed near the outer edges of only the lower armature 4 outside the permanent magnets 5. The bearing members 30, the connecting pins 41 and the actuating noses 31 are integrally molded with the armatures 3, 4. Bearing studs 24' of semi-circular cross-section extend between opposite inner surfaces of the frame member 11 and webs 46 integrally disposed within the frame member 11. Thus, the studs 24' are supported at both of their ends so that they have high strength and dimensional stability. At the same time, the existence of the webs 46 and their connection to the respective inner surfaces of the frame member 11 through the studs 24' increase the strength and dimensional stability of the frame member 11.

The upper and lower armatures 3, 4 are pivotally supported by placing the frame-like balancing spring 35 at two sides thereof on the projections 12 molded to opposite inner sides of the frame member 11, and bringing the semi-circular cutouts in the pair of bearing members 30 on the

lower armature 4 in contact with the semi-circular lower bearing surfaces of the studs 24'.

Figs. 9 and 10 show another way of connecting the permanent magnets 5 between the upper and lower armatures 3, 4, which structure may be employed in either of the relays according to Figs. 1 to 8. The permanent magnets 5 serve as spacers defining the interval between the upper and lower armatures 3, 4 and employ iron alloy magnets of the alnico series (Fe—Ni—Co) or the Fe—Cr—Co series. The mutually facing inner surfaces of the armatures 3, 4 are provided with sockets 36 of thermoplastic synthetic resin providing a wall for surrounding the mounting faces of the permanent magnets 5. When the magnets 5 are welded to the armatures 3, 4 by means of welding electrodes shown in Fig. 10, blast debris at high temperature which are ejected from the welding location strike against the inner socket walls and are thus prevented from scattering to the outside. Projections 37 are provided on the magnet mounting faces of the armatures, which projections serve to stabilize the welding process. Compared to the connecting pins 41 shown in the embodiments of Figs. 1 and 8, the welded connection explained with reference to Figs. 9 and 10 provides improved dimensional stability and strength and increased working efficiency of the armature assembly.

The further embodiment shown in Figs. 11 and 12 differs from those described above in that the flat, rectangular frame-shaped upper and lower armatures 3, 4 are interconnected at two opposite ends by brackets 18 each of which has an integrally molded stud 24". The studs 24" define a pivot axis for the armature assembly which extends along the axis of the coil 20. The studs 24" are supported by bearing members (not shown) which may be provided at opposite inner walls of the frame member 11. As in the previous embodiments, two permanent magnets 5 are disposed between the upper and lower armatures 3, 4 to magnetize them with opposite polarities. Both end portions of the iron core 21' extending from the coil 20 are bent perpendicularly to the coil axis to opposite sides.

Contact springs (now shown) driven by the armature assembly are disposed parallel to and along those sides of the armatures which are in contact with the permanent magnets 5. The armatures are dimensioned so as to extend beyond the permanent magnets 5 and the contact springs are disposed between the armatures in a manner similar to that shown in Fig. 4.

Claims

1. An electromagnetic relay comprising
a coil assembly (2) including a coil (20) and a core (21) penetrating through the coil and having end portions extending from the coil,
an armature assembly including a pair of upper and lower armatures (3, 4) of rectangular frame-shape surrounding said coil (20) and having end portions disposed opposite said core end por-

tions, and at least one permanent magnet (5) disposed between said upper and lower armatures, the armature assembly being pivotal about an axis defined by a pair of studs (24), and

at least one contact unit (6, 8) including a fixed contact (8) and a movable contact spring (6) operated by said armature assembly,

characterised in that, in the top view of the relay, said contact unit (6, 8) is positioned laterally of said coil assembly (2), and that said movable contact spring (6) is disposed within a space (S) defined by said upper and lower armatures (3, 4) extending beyond said permanent magnet (5), said space (S) being located on that side of the permanent magnet (5) which faces away from said coil assembly (2).

2. The relay of claim 1, wherein said coil assembly (2) is covered by a molded casing (23), said pair of studs (24) being integrally formed at opposite sides of the molded casing so that said pivot axis of the armature assembly extends transversely of the coil axis.

3. The relay of claim 1, wherein said pair of studs (24') are formed inside a housing frame member (11) of the relay positioning the coil assembly (2) so that the pivot axis of said armature assembly extends transversely of the coil axis.

4. The relay of claim 3, wherein each stud (24') extends between an inner wall of said frame member (11) and a web (46) provided integrally with the frame member.

5. The relay of claim 1, wherein said studs (24'') are provided on brackets (18) interconnecting said upper and lower armatures (3, 4) so that the pivot axis of said armature assembly extends along the coil axis, said core end portions being bent so as to extend transversely of the coil axis.

6. The relay of any of claims 1 to 5, wherein said at least one permanent magnet (5) is welded to the inner surface of at least one of said upper and lower armatures (3, 4) inside a socket wall (36) of synthetic resin surrounding the surface portion of the armature to which said magnet is welded.

7. The relay of any of claims 1 to 6, wherein said upper and lower armatures (3, 4) have nose portions (31) formed on the surfaces facing each other for actuating said contact spring (6).

8. The relay of any of claims 1 to 4, wherein each of said upper and lower armatures (3, 4) has means (30) which together form a pair of bearings for receiving said pair of studs (24).

9. The relay of any of claims 1 to 8, further comprising a casing (1) including

a frame member (11) mounting said coil assembly (2) and contact unit (6, 8) and having terminals (14) connected to said coil and said contact unit and extending to the outside of the frame member, and

upper and lower covers (9, 10) having peripheral portions engaging opposite edges of the frame member for sealingly enclosing said coil and armature assemblies and contact unit.

10. The relay of claim 9, wherein in either pair of mutually engaging cover peripheral portion and

frame edge one has a projection (13) and the other has a groove (19) receiving the projection, with a sealant (53) being inserted between said groove and projection.

5 11. The relay of claim 9 or 10, wherein said coil (20) has at least two end portions (50) and at least two of said terminals (14) have inner end portions (51) connected to said coil end portions, and wherein ribs (52) are formed integrally with said upper and lower covers (9, 10) adjacent said frame member (11) so as to project inwardly of said casing (1) and approach outer surfaces of said interconnected coil and terminal end portions (50, 51).

10 12. The relay of any of claims 9 to 11, wherein said core end portions have recesses (25) and said frame member (11) has integrally formed inner projections (12) engaging said recesses.

20 Patentansprüche

1. Elektromagnetisches Relais, umfassend

eine Spulenanordnung (2) mit einer Spule (20) und einem Kern (21), der die Spule durchsetzt und von der Spule herausragende Endabschnitte aufweist,

eine Ankeranordnung mit einem Paar aus einem oberen und einem unteren Anker (3, 4) einer die Spule (20) umgebenden Rahmenform mit den Endabschnitten des Kerns gegenüberliegenden Endabschnitten und mit mindestens einem zwischen dem oberen und dem unteren Anker angeordneten Dauermagnet (5), wobei die Ankeranordnung um eine von einem Paar von Zapfen (24) definierte Achse schwenkbar ist, und

mindestens eine Kontaktseinheit (6, 8) mit einem Festkontakt (8) und einer von der Ankeranordnung betätigten bewegbaren Kontaktfeder (6),

dadurch gekennzeichnet,

daß in der Draufsicht auf das Relais die Kontaktseinheit (6, 8) seitlich von der Spulenanordnung (2) angeordnet ist, und

daß die bewegbare Kontaktfeder (6) innerhalb eines Raumes (S) angeordnet ist, der von dem oberen und dem unteren, über den Dauermagnet (5) hinausragenden Anker (3, 4) definiert ist und auf der von der Spulenanordnung (2) abgewandten Seite des Dauermagnets (5) liegt.

40 2. Relais nach Anspruch 1, wobei die Spulenanordnung (2) mit einem geformten Gehäuse (23) bedeckt ist, und wobei die beiden Zapfen (24) auf entgegengesetzten Seiten des geformten Gehäuses derart angeformt sind, daß die Schwenkachse der Ankeranordnung quer zur Spulenachse verläuft.

45 3. Relais nach Anspruch 1, wobei die beiden Zapfen (24') innerhalb eines Gehäuse-Rahmenelements (11) des Relais ausgebildet sind und die Spulenanordnung (2) so positionieren, daß die Schwenkachse der Ankeranordnung quer zur Spulenachse verläuft.

50 4. Relais nach Anspruch 3, wobei jeder Zapfen (24') zwischen einer inneren Wand des Rahmenelements (11) und einem mit diesem einstückig ausgebildeten Steg (46) verläuft.

5. Relais nach Anspruch 1, wobei die Zapfen (24") an den oberen und den unteren Anker (3, 4) miteinander verbindenden Trägern (18) derart vorgesehen sind, daß die Schwenkachse der Ankeranordnung längs der Spulenachse verläuft, wobei die Endabschnitte des Kerns so gebogen sind, daß sie quer zur Spulenachse verlaufen.

6. Relais nach einem der Ansprüche 1 bis 5, wobei der besagte mindestens eine Dauermagnet (5) an die Innenfläche des oberen und/oder unteren Ankers (3, 4) innerhalb einer aus Kunstharz bestehenden Sockelwandung (36) angeschweißt ist, die denjenigen Flächenabschnitt des Ankers umgibt, an den der Magnet angeschweißt ist.

7. Relais nach einem der Ansprüche 1 bis 6, wobei an den einander zugewandten Oberflächen des oberen und des unteren Ankers (3, 4) Nasenabschnitte (31) zur Betätigung der Kontaktfeder (6) ausgebildet sind.

8. Relais nach einem der Ansprüche 1 bis 4, wobei der obere und der untere Anker (3, 4) jeweils Einrichtungen (30) aufweisen, die miteinander ein Paar von Lagern zur Aufnahme der beiden Zapfen (24) bilden.

9. Relais nach einem der Ansprüche 1 bis 8, ferner umfassend ein Gehäuse (1) mit

einem Rahmenteil (11) zur Montage der Spulenanordnung (2) und der Kontakteinheit (6, 8) mit Anschlüssen (14), die mit der Spule und der Kontakteinheit verbunden sind und von dem Rahmenteil nach außen verlaufen, und

oberen und unteren Deckeln (9, 10) mit Randabschnitten, die in gegenüberliegende Kanten des Rahmteils eingreifen, um die Spulenanordnung, die Ankeranordnung und die Kontakteinheit dichtend zu umschließen.

10. Relais nach Anspruch 9, wobei von jedem ineinandergrifenden Paar aus Deckel-Randabschnitt und Rahmenkante das eine Teil einen Vorsprung (13) und das andere eine den Vorsprung aufnehmende Nut (19) aufweist, und wobei zwischen Nut und Vorsprung ein Dichtungsmittel (53) eingefügt ist.

11. Relais nach Anspruch 9 oder 10, wobei die Spule (20) mindestens zwei Endabschnitte (50) aufweist und mindestens zwei der Anschlüsse (14) innere Endabschnitte (51) haben, die mit den Endabschnitten der Spule verbunden sind, und wobei an den oberen und den unteren Deckel (9, 10) nahe dem Rahmteil (11) Rippen (52) angeformt sind, die in das Gehäuse (1) nach innen ragen und nahe den Außenflächen der miteinander verbundenen Spulen und Anschluß-Endabschnitte (50, 51) liegen.

12. Relais nach einem der Ansprüche 9 bis 11, wobei die Endabschnitte des Kerns Aussparungen (25) aufweisen und an das Rahmteil (11) innere Vorsprünge (12) angeformt sind, die in die Aussparungen eingreifen.

Revendications

1. Relais électromagnétique comprenant:
un ensemble à bobine (2) comprenant une bobine (20) et un noyau (21) pénétrant à l'intérieur

de la bobine et possédant des parties d'extrémité s'étendant à partir de cette dernière,

5 un ensemble à armatures comportant un couple d'armatures supérieure et inférieure (3, 4) en forme de cadres rectangulaires entourant ladite bobine (20) et comportant des parties d'extrémité situées en vis-à-vis desdites parties d'extrémité du noyau, et au moins un aimant permanent (5) disposé entre lesdites armatures supérieure et inférieure, l'ensemble à armatures pouvant pivoter autour d'un axe défini par un couple de tourillons (24), et

10 au moins une unité de contact (6, 8) comprenant un contact fixe (8) et un ressort de contact mobile (6) actionné par ledit ensemble à armatures, caractérisé en ce que:

15 sur la vue en plan du relais, ladite unité de contact (6, 8) est disposée latéralement par rapport audit ensemble à bobine (2), et

20 que ledit ressort de contact mobile (6) est disposé dans un espace (S) défini par lesdites armatures supérieure et inférieure (3, 4) s'étendant au-delà dudit aimant permanent (5), ledit espace (S) étant situé sur la face de l'aimant permanent (5), qui est tournée à l'opposé dudit ensemble à bobine (2).

25 2. Relais selon la revendication 1, dans lequel ledit ensemble à bobine (2) est recouvert par un boîtier moulé (23), ledit couple de tourillons (24) étant formé d'un seul tenant sur des côtés opposés du boîtier moulé de sorte que ledit axe de pivotement de l'ensemble à armatures s'étend transversalement par rapport à l'axe de la bobine.

30 3. Relais selon la revendication 1, dans lequel ledit couple de tourillons (24') est formé à l'intérieur d'un organe en forme de cadre (11) formant logement du relais, de manière à positionner l'ensemble de bobine (2) de telle sorte que l'axe de pivotement dudit ensemble à armatures s'étend transversalement par rapport à l'axe de la bobine.

35 4. Relais selon la revendication 3, dans lequel chaque tourillon (24') s'étend entre une paroi intérieure dudit élément formant cadre (11) et une barre (46) réalisée d'un seul tenant avec l'élément formant cadre.

40 5. Relais selon la revendication 1, dans lequel lesdits tourillons (24") sont prévus sur des consoles (18) qui relient lesdites armatures inférieure et supérieure (3, 4) de telle sorte que l'axe de pivotement dudit ensemble à armatures s'étend le long de l'axe de la bobine, lesdites parties d'extrémité du noyau étant coudées de manière à s'étendre transversalement par rapport à l'axe de la bobine.

45 6. Relais selon l'une quelconque des revendications 1 à 5, dans lequel ledit aimant permanent (5) prévu au moins en un exemplaire, est soudé sur la surface intérieure d'au moins l'une desdites armatures supérieure et inférieure (3, 4), à l'intérieur d'une paroi formant douille (36) constituée en résine synthétique et entourant l'élément de surface de l'armature, sur lequel ledit aimant est soudé.

50 7. Relais selon l'une quelconque des revendica-

tions 1 à 6, dans lequel lesdites armatures supérieure et inférieure (3, 4) comportent des parties en forme d'ergots (31) ménagés sur les surfaces tournées l'une vers l'autre afin d'actionner ledit ressort de contact (6).

8. Relais selon l'une quelconque des revendications 1 à 4, dans lequel chacune desdites armatures supérieure et inférieure (3, 4) comporte des moyens (30) qui forment ensemble un couple de paliers servant à recevoir ledite couple de tourillons (24).

9. Relais selon l'une quelconque des revendications 1 à 8, comportant en outre un boîtier (1) comprenant:

un élément en forme de cadre (30) servant au montage dudit ensemble à bobine (2) et de l'unité de contact (6) et comportant des bornes (14) raccordées à ladite bobine et à ladite unité de contact et s'étendant à l'extérieur de l'élément en forme de cadre, et

des couvercles supérieur et inférieur (9, 10) comportant des parties périphériques contactant des bords opposés de l'élément en forme de cadre afin de renfermer de façon étanche ledit ensemble à bobine et ledit ensemble-à armatures et l'unité de contact.

10. Relais selon la revendication 9, dans lequel

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l'un des deux éléments constitué par la partie périphérique des couvercles et le bord du cadre, qui se contactent réciproquement, comporte une partie saillante (13) et l'autre de ces éléments comporte une gorge (19) recevant la partie saillante, un organe d'étanchéité (53) étant inséré entre ladite gorge et ladite partie saillante.

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11. Relais selon la revendication 9 ou 10, dans lequel ladite bobine (20) comporte au moins deux parties d'extrémité (50), et au moins deux desdites bornes (14) comportant des parties d'extrémité intérieures (51) raccordées auxdites parties d'extrémité de la bobine, et dans lequel des nervures (52) sont réalisées d'un seul tenant avec lesdits couvercles supérieur et inférieur (9, 10) au voisinage dudit élément en forme de cadre (11) de manière à faire saillie à l'intérieur dudit boîtier (1) et se rapproche des surfaces extérieures desdites parties d'extrémité interconnectées (50, 51) de la bobine et des bornes.

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12. Relais selon l'une quelconque des revendications 9 à 11, dans lequel lesdites parties d'extrémité du noyau comportent des renflements (25) et ledit élément en forme de cadre (11) comporte des parties saillantes intérieures (12) réalisées d'un seul tenant et s'engageant dans lesdits renflements.

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FIG. 1

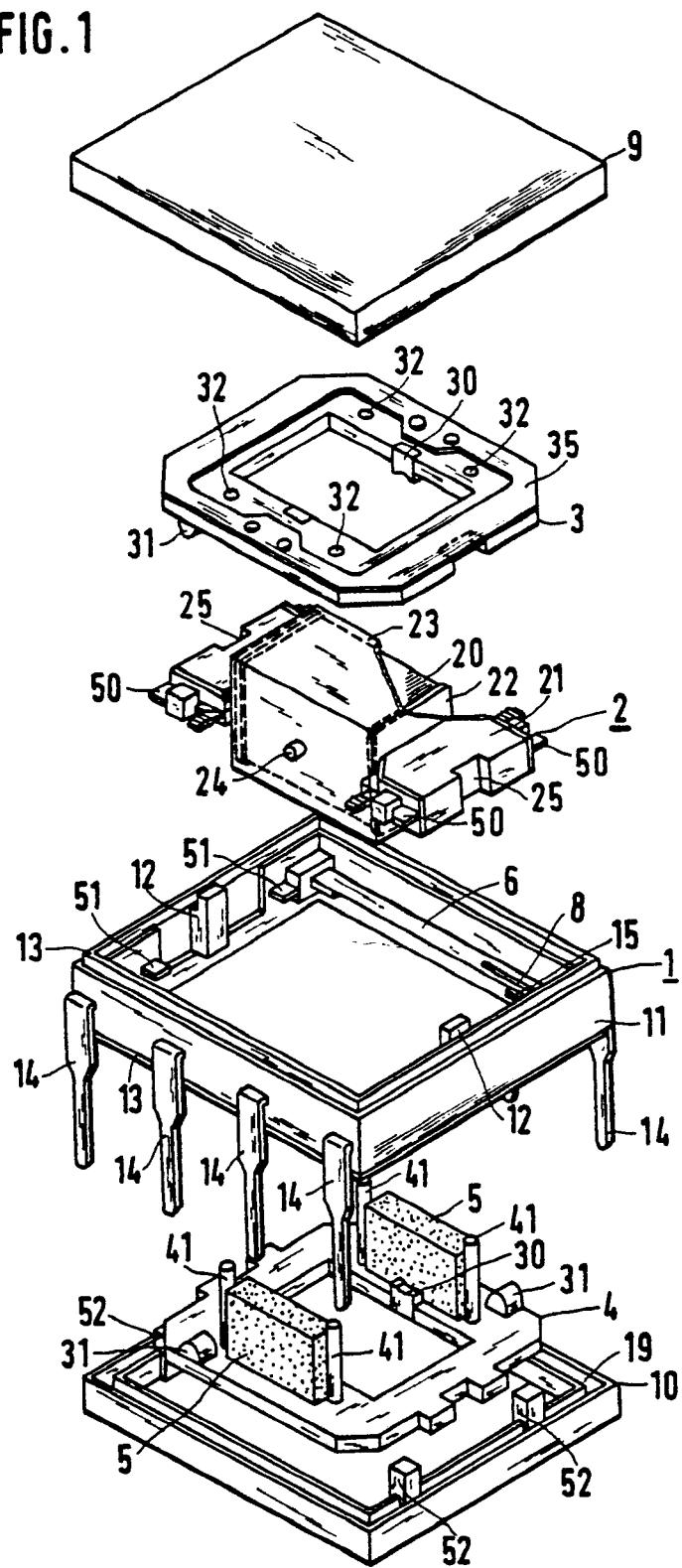


FIG. 2

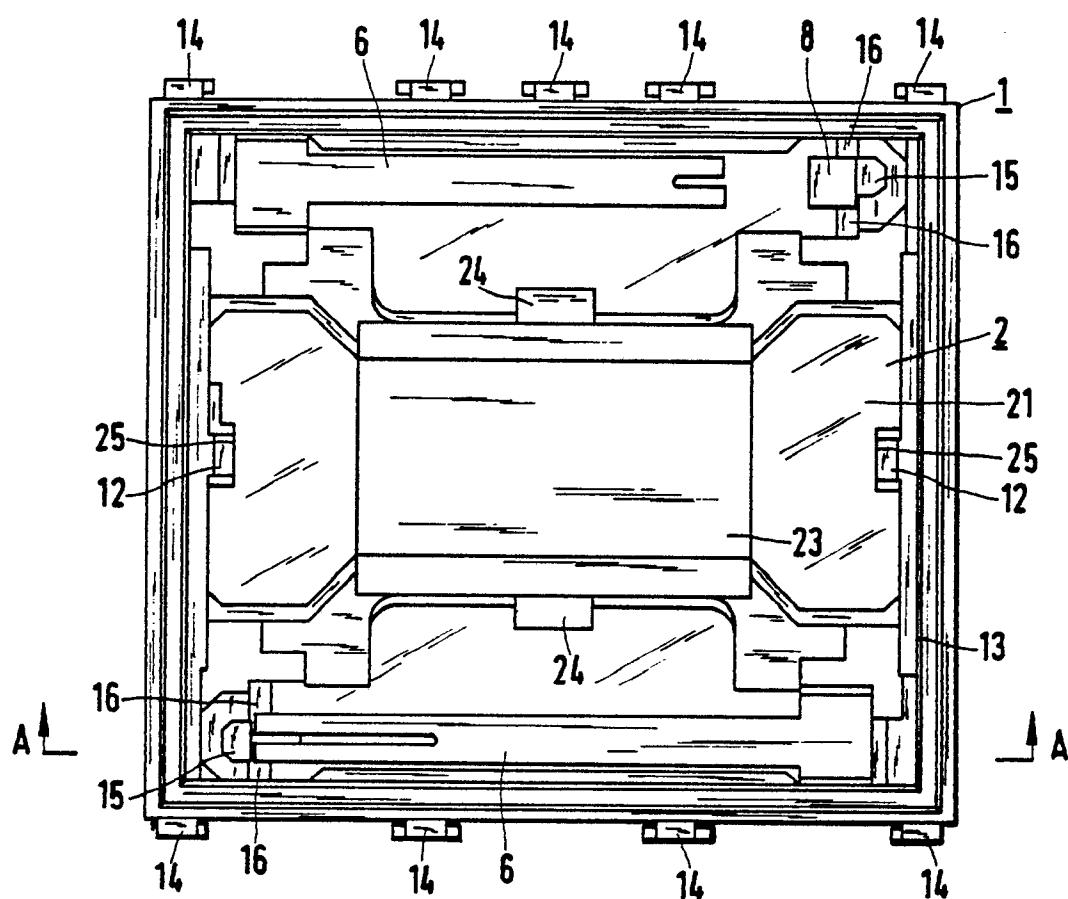


FIG. 3

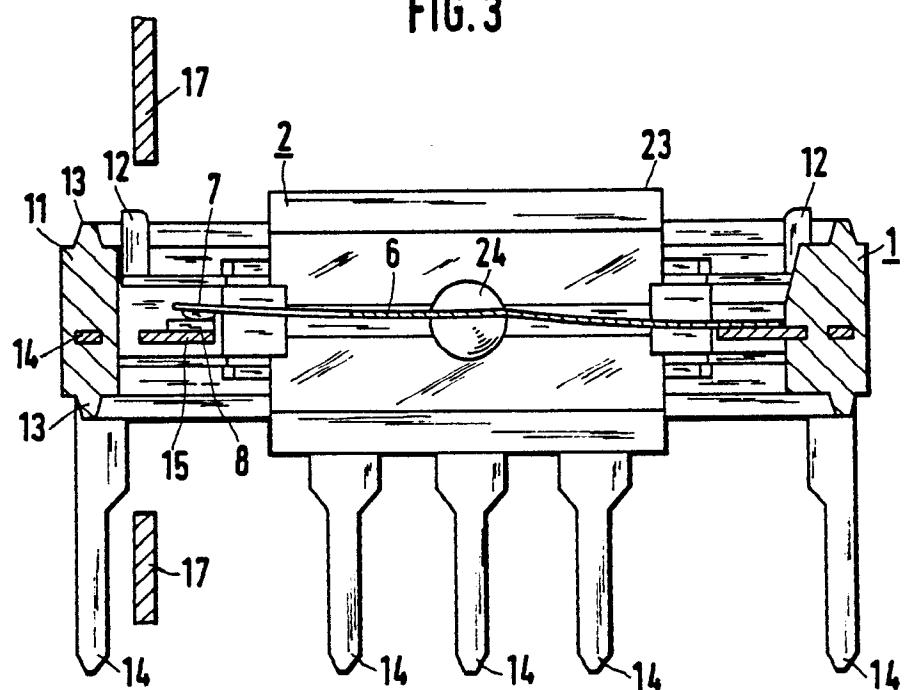


FIG. 4

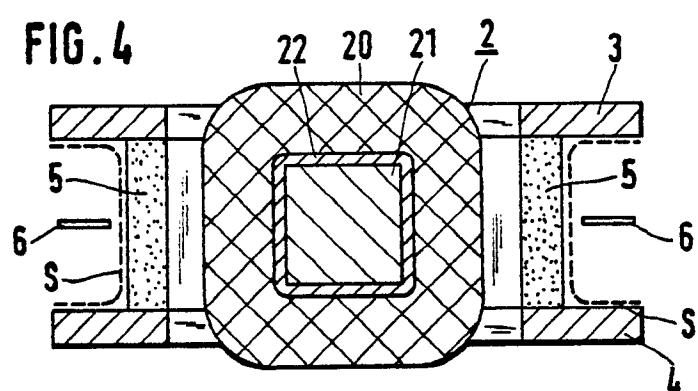


FIG. 5

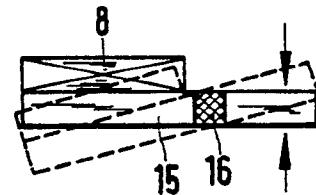


FIG. 6

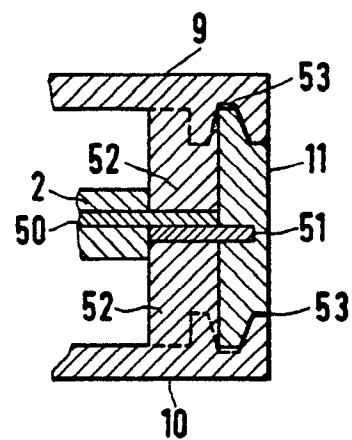


FIG. 7

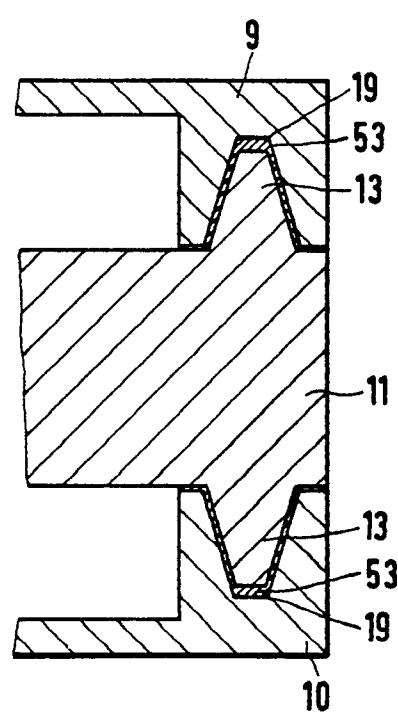
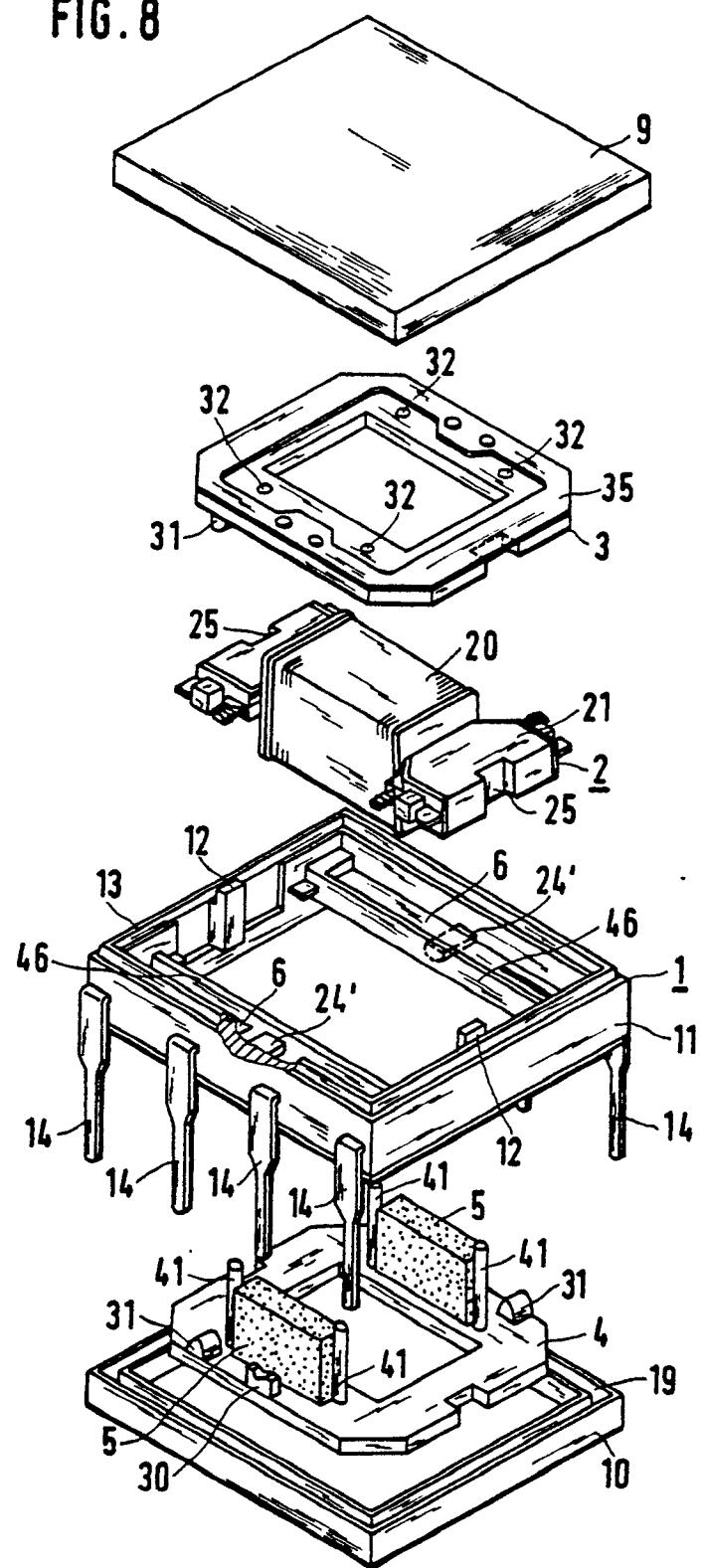


FIG. 8



0 117 451

FIG.9

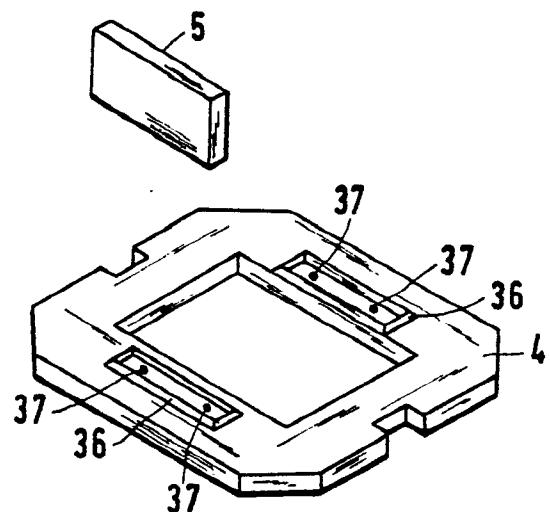


FIG.10

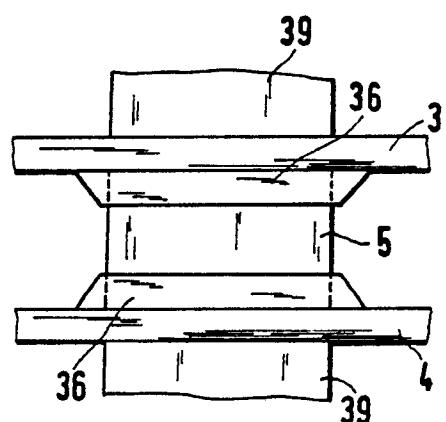


FIG. 11

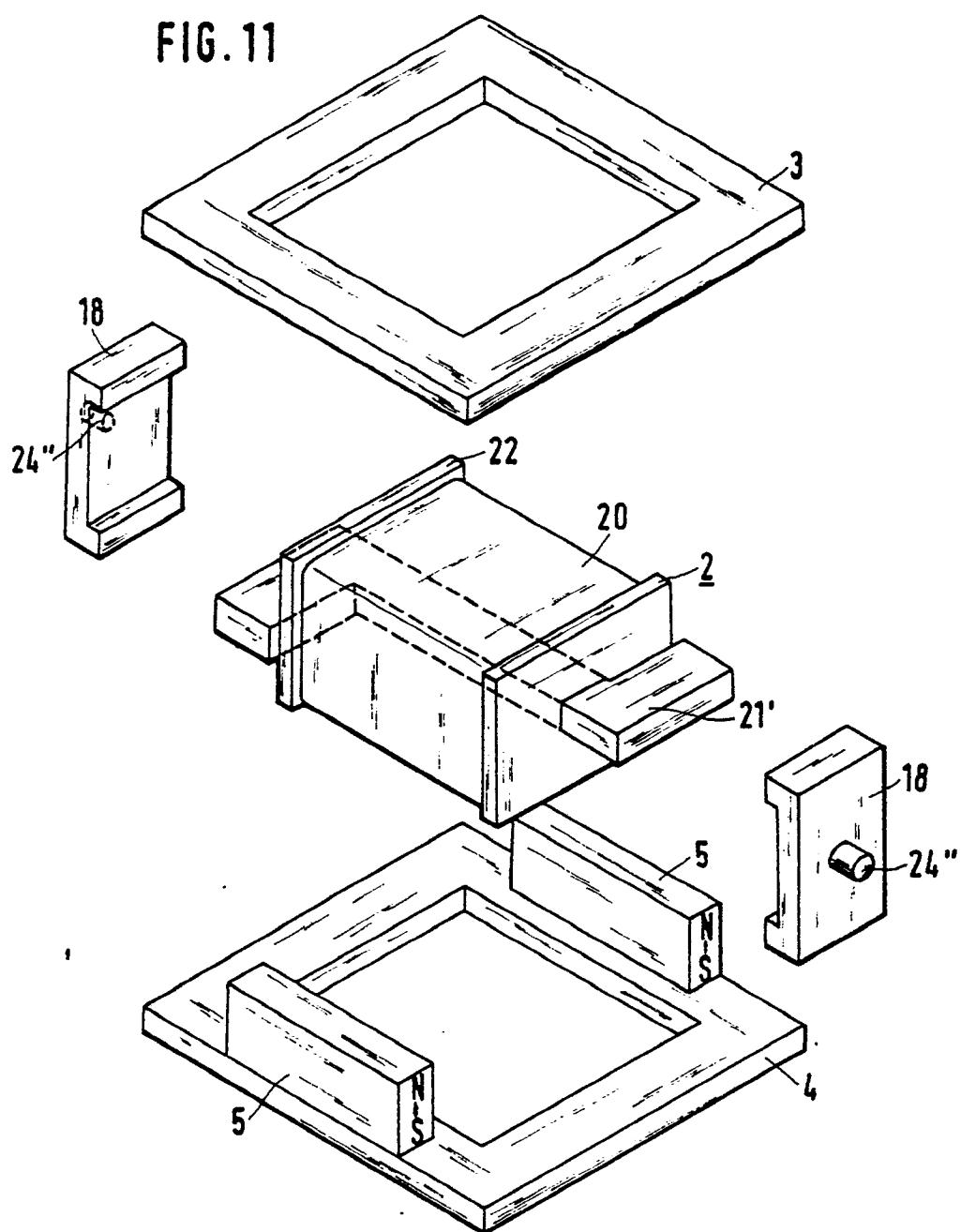


FIG. 12

