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The invention relates to a magnetic system for rapid disconnection according to the preamble of claim 1.

A magnetic system of this type is already known (DE-PS 20 29 607). The magnetic system, which is accommodated in a synthetic material housing for relays, has a hinged armature which uses an armature mounting in the form of a leaf spring. This leaf spring is fastened to the coil former of the magnetic system, this being associated with a relatively extended suspension. A sliding armature movement in the longitudinal direction is the result, leading to considerable abrasion on the rear knife edge of a first arm of the relevant pole piece. As the coil former which is pushed onto the second arm of the pole piece has a certain degree of clearance, the dimensional relationships furthermore cannot be accurately fixed. The tension spring, which is important for interaction with the leaf spring and plays an important role in the movement of the hinged armature, is relatively difficult to mount on account of its being fastened to a base plate loop arrangement mounted perpendicular to the axis of the spring.

A similar magnetic system is furthermore known from DE-PS 20 00 138. In this case too the armature mounting is designed as a leaf spring which is fastened on the one hand to a pole shoe and on the other hand to a hinged armature. A helical spring ensures the interruption of the magnetic circuit by tipping the hinged armature. The interaction of the hinged armature

with the leaf spring and the helical spring is, however, relatively complicated for reasons of design and requires costly adjustment.

Furthermore, a magnetic system for rapid disconnection is known which uses as armature mounting a leaf spring which is provided with a box-shaped extension which can be attached to the free pole piece (DE-OS 36 43 510). A deflected part of the leaf spring is connected to the end of the hinged armature projecting over the free pole piece. The manufacture of the leaf spring is costly and requires a complicated bending tool.

The previously described magnetic systems are very sensitive to changes in the magnetic circuit, particularly to changes in the air gap values between the pole piece and the hinged armature. The air gap distances between the two parts of the magnetic circuit depend on the surfaces at the contact points and on particles located between the surfaces. Changes in the position of the parts of the magnetic circuit in relation to each other can also produce a change in the air gap, which is caused by differing support points.

The object of the invention is to further develop a magnetic system of the type described above and to guarantee response values which are as constant as possible, even after a high number of switching cycles, wherein an improved armature mounting must be obtained as a matter of priority. The components necessary for this should be simple to manufacture and make accurate mounting positions possible using a simple assembly technique.

This object is achieved according to the invention by the combination of design features given in the

characterising part of claim 1.

The advantages achieved by the invention consist in that the leaf spring is constructed as a part which is simple to manufacture and which serves almost exclusively to guide the armature, wherein forces are only exerted on the hinged armature in the longitudinal direction. Advantageous embodiments of the subject according to claim 1 can be drawn from the sub-claims.

An embodiment of the invention is represented in the drawings and is described in more detail in the following. The drawings show:

Fig. 1 a perspective representation of a magnetic system for rapid disconnection;

Fig. 2 a perspective representation of an armature mounting for the hinged armature of this magnetic system.

In accordance with Fig. 1, the carrying part of the magnetic system is a pole piece 1, a small detail of a first arm of which can be recognised. A coil former 2, which carries a winding 3, is attached to a second arm of this pole piece, which is not visible. The magnetic circuit is closed by a hinged armature 4 which rests on both arms of the pole piece in the rest state. A U-shaped leaf spring 5 serves as a mounting for the hinged armature 4 and its arm ends 6 are connected to an armature bearing 7 which is box-shaped. If the load direction of the armature mounting is constant, it is sufficient if the latter is simply attached to the first arm of the pole piece 1 with slight initial tension. Displacement cannot occur. It is thereby guaranteed that after every load cycle, pole piece 1 and hinged armature

4 contact each other again at exactly the same points and the magnetic circuit attains identical values again each time.

As the parts of the magnetic circuit comprise soft magnetic material and have poor mechanical properties, a good armature mounting is necessary for a reliable magnetic system. In this connection, a bearing edge 9 of the armature bearing 7 is formed such that a very small gap is formed when the magnetic circuit is closed by the hinged armature 4. When the hinged armature 4 is tipped, the latter reaches the bearing edge 9 after only a very short distance, the said bearing edge 9 having favourable bearing properties, since the whole armature bearing 7 is manufactured from synthetic material, and consequently making a sliding movement possible with only very little abrasion.

Furthermore, on the narrow sides and on the side facing the hinged armature 4, the armature bearing 7 has two crosspieces which serve to position the armature bearing 7 on the first arm of the pole piece 1. It is thereby guaranteed that the bearing edge 9 can be positioned very accurately tool-wise in relation to the pole surface of the first arm of the pole piece 1. As a result, an optimum position of the bearing edge 9 is always guaranteed in the finished system. Relatively great abrasion occurs when parts made of soft magnetic material slide one on top of the other. If these abraded particles get into the air gap, the magnetic properties change and consequently also the response values. The metal parts are almost completely prevented from sliding on each other by the mounting described above.

The leaf spring 5 is connected to the armature bearing 7 on a support 10 which is connected to the armature

bearing 7 so as to form one piece. These two parts are connected by means of spot welding at the fastening points 11.

A tension spring 12 has the task of causing the hinged armature 4 to tip in the event of release. This happens as a result of the magnetic field of a permanent magnet 13 being neutralised by an opposing electro-magnetic field in the winding 3. By means of the movement of the hinged armature 4, a release pin 14 is pushed outwards through a cap 16 in order to actuate a switch latch (not shown). The entire arrangement of the magnetic system is accommodated on a housing underpart 15 which is closed by the cap 16.

Details of the armature mounting are shown in Fig. 2. The leaf spring 5 is substantially U-shaped, the two arm ends 6 being connected to the armature bearing 7 via the support 10. The armature mounting, which comprises the leaf spring 5 and the armature bearing 7, is a metal / synthetic material composite part. The support 10 serves to connect these two parts, the fastening points for spot welding being indicated by 11. The two crosspieces 8 of the armature bearing 7 ensure that the armature mounting sits accurately on the first arm of the pole piece 1. The bearing edge 9 has a decisive influence on the tipping point of the hinged armature 4 together with the leaf spring 5 fastened to the hinged armature 4. Both the tipping point of the hinged armature 4 and the fastening points 11 lie directly on the first arm of the pole piece, thereby guaranteeing that the hinged armature 4 retains a constant position in relation to the pole piece 1.

Claims

1. A magnetic system for rapid disconnection, having a U-shaped pole piece (1) which is rectangular in cross-section, a hinged armature (4) and an associated armature mounting (5, 7), characterised in that the armature mounting comprises a U-shaped leaf spring (5) and a box-shaped armature bearing (7) which can be mounted on a first arm of the pole piece (1), in that the arm ends (6) of the leaf spring (5) are connected to the armature bearing (7) in such a way that the fastening points (11) between the leaf spring (5) and the armature bearing (7), and the tipping point of the hinged armature (4) on a bearing edge (9) of the armature bearing (7) lie directly on the first arm of the pole piece (1).
2. A magnetic system according to claim 1, characterised in that the leaf spring (5) comprises a spring steel strip which is connected to the armature bearing (7) made of synthetic material.
3. A magnetic system according to either one of claims 1 and 2, characterised in that the armature mounting (5, 7) is a metal / synthetic material composite part.
4. A magnetic system according to any one of claims 1 to 3, characterised in that the leaf spring (5) is connected to the hinged armature (4) on the one hand and the armature bearing (7) on the other by means of spot welding.
5. A magnetic system according to any one of claims 1 to 4, characterised in that the armature bearing (7) is formed with crosspieces (8) on the side facing



the hinged armature (4) for positioning on the pole piece (1), the crosspieces (8) being spaced apart such that the hinged armature (4) is supported on the two arms of the pole piece (1) in the closed state and is movable between the crosspieces (8) in a non-contacting manner when released.

6. A magnetic system according to any one of claims 1 to 5, characterised in that the arms (6) of the leaf spring (5) are guided past the narrow sides of the armature bearing (7) in a non-contacting manner and are each connected to a support (10) which is formed in one piece with the armature bearing (7).