STAGGERED DOUBLE MOVABLE CONTACT SPRING

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an assembly of a contact system in a magnetic latching relay, and more particularly, to a staggered double movable contact spring.

2. Description of the Prior Art

The magnetic latching relay maintains an opened status or a closed status of a contact system by means of a retaining force provided by a magnetic circuit system, and enables the contact system to switch between the opened status and the closed status by means of a drive force provided by a drive system and through a driving medium. Opening and closing of the contact system are accomplished through deformation of a movable contact spring which drives a movable contact to be separated from and contact with a stationary contact. Therefore, the drive system needs to provide a sufficient drive force to deform the movable contact spring in order to accomplish switching of the relay between the opened status and the closed status. To enhance the operation reliability of the relay, the existing design of the movable contact spring generally applies a preliminary pressure to the movable contact spring in advance through elastic deformation of the movable contact spring so that the movable contact spring can drive the movable contact to enter the opened initial status in which it is separated from the stationary contact or to enter the closed initial status in which it contacts with the stationary contact. In this case, the drive system needs a larger drive force to accomplish switching of the relay between the opened status and the closed status.

If the requirements on the magnitude of the drive force can be effectively reduced, then the design requirements on the drive system can be reduced directly and the power consumption of the drive system can be decreased effectively. Because the magnitude of the drive force needed is closely related with the magnitude of the force that deforms the movable contact spring, it can be readily contemplated that the

magnitude of the drive force needed can be reduced by thinning or lengthening the movable contact spring. However, the design of the movable contact spring is often limited by requirements such as the dimensions of the relay and the current conveyance capacity, so it is difficult to reduce the requirements on the magnitude of the drive force by changing the dimensions of the movable contact spring.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide a staggered double movable contact spring which can effectively reduce the requirements on the magnitude of the drive force.

To achieve the aforesaid objective, the present invention provides a staggered double movable contact spring, which comprises a movable contact spring body. A head portion of the movable contact spring body is divided into an upper sheet and a lower sheet both being provided with a movable contact respectively, and a tail portion of the movable contact spring body connects the upper sheet and the lower sheet into one piece. A head portion of the upper sheet and a head portion of the lower sheet are disposed to be separated from and staggered with each other in a moving direction of the movable contacts so that the upper sheet and the lower sheet are staggered.

By changing the existing unitary movable contact spring into the staggered double movable contact spring, only a drive force of a part of the original magnitude is needed for pushing the upper sheet or pulling out the lower sheet to deform the upper sheet or the lower sheet to accomplish switching of the relay between the opened status and the closed status without changing the overall dimensions and the material of the movable contact spring.

To enable a drive force as small as possible to satisfy the requirements for deformation of both the upper sheet and the lower sheet, the head portion of the movable contact spring body is bisected into the upper sheet and the lower sheet which have the same width as each other.

By bisecting the head portion of the movable contact spring body into the upper sheet and the lower sheet which have the same width as each other, only a drive force of a half of the original magnitude is needed to deform the upper sheet or the lower sheet to accomplish switching of the relay between the opened status and the closed

status.

To enable a drive force as small as possible to satisfy the requirements for deformation of both the upper sheet and the lower sheet, the head portion of the movable contact spring body may also be divided into the upper sheet and the lower sheet which have different widths from each other, and a longitudinal arced portion is disposed on one of the upper sheet and the lower sheet that has a larger width.

The longitudinal arced portion is advantageous for reducing the drive force needed for deformation of the wider sheet, which can be adjusted to be consistent with the drive force needed for deformation of the narrower sheet. Thereby, only a drive force of less than a half of the original magnitude is needed to deform the upper sheet or the lower sheet to accomplish switching of the relay between the opened status and the closed status.

In order to further reduce the drive force needed for deformation of the wider sheet, a lateral through-slot may be formed in the longitudinal arced portion disposed on the sheet that has a larger width.

The lateral through-slot is advantageous for further reducing the drive force needed for deformation of the wider sheet, which can be adjusted within a larger range and is further guaranteed to be consistent with the drive force needed for deformation of the narrower sheet. Thereby, only a drive force of less than a half of the original magnitude or even a smaller magnitude is needed to deform the upper sheet or the lower sheet to accomplish switching of the relay between the opened status and the closed status.

The present invention features novel design and a skillful and reasonable structure and can effectively reduce the requirements on the magnitude of the drive force so that the drive system can satisfy stricter design requirements and have the power consumption thereof significantly reduced. Therefore, the present invention can be widely applied in contact systems of various types of magnetic latching relays.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic structural view of an embodiment (1); and

Fig. 2 is a schematic structural view of an embodiment (2).

Reference numerals in the drawings are respectively: (1) upper sheet, (2) lower sheet,

(3) (4) movable contact, (5) arced portion, and (6) through-slot.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinbelow, the present invention will be further detailed with reference to the accompanying drawings.

Embodiment (1):

Referring to Fig. 1, a staggered double movable contact spring of the present invention comprises a movable contact spring body. A head portion of the movable contact spring body is bisected into an upper sheet (1) provided with a movable contact (3) and a lower sheet (2) provided with a movable contact (4), with the upper sheet (1) and the lower sheet (2) having the same width as each other. A tail portion of the movable contact spring body connects the upper sheet (1) and the lower sheet (2) into one piece. A head portion of the upper sheet (1) and a head portion of the lower sheet (2) are disposed to be separated from and staggered with each other in a moving direction of the movable contacts (3), (4) so that the upper sheet (1) and the lower sheet (2) are staggered.

By bisecting the head portion of the movable contact spring body into the upper sheet (1) and the lower sheet (2) which have the same width as each other and are staggered with each other, only a drive force of a half of the original magnitude is needed to deform the upper sheet (1) or the lower sheet (2) to accomplish switching of the relay between the opened status and the closed status.

Embodiment (2):

Referring to Fig. 2, a staggered double movable contact spring of the present invention comprises a movable contact spring body. A head portion of the movable contact spring body is divided into an upper sheet (1) provided with a movable contact (3) and a lower sheet (2) provided with a movable contact (4), with the upper sheet (1) having one third of a width of the head portion of the movable contact spring body and the lower sheet (2) having two thirds of the width of the head portion of the movable contact spring body. A tail portion of the movable contact spring body connects the upper sheet (1) and the lower sheet (2) into one piece. A head portion of the upper sheet (1) and a head portion of the lower sheet (2) are disposed to be separated from and staggered with each other in a moving direction of the movable contacts (3), (4)

so that the upper sheet (1) and the lower sheet (2) are staggered. A longitudinal arced portion (5) is disposed on the lower sheet (2) having two thirds of the width of the head portion of the movable contact spring body. A lateral through-slot (6) is formed in the longitudinal arced portion (5) disposed on the lower sheet (2).

The longitudinal arced portion (5) and the lateral through-slot (6) are advantageous for reducing the drive force needed for deformation of the lower sheet (2) having two thirds of the width of the head portion of the movable contact spring body, which can be adjusted to be consistent with the drive force needed for deformation of the upper sheet (1) having one third of the width of the head portion of the movable contact spring body. Thereby, only a drive force of one third of the original magnitude is needed to deform the upper sheet (1) or the lower sheet (2) to accomplish switching of the relay between the opened status and the closed status.

WHAT IS CLAIMED IS:

1. A staggered double movable contact spring, comprising a movable contact spring body, wherein: a head portion of the movable contact spring body is divided into an upper sheet and a lower sheet both being provided with a movable contact respectively, and a tail portion of the movable contact spring body connects the upper sheet and the lower sheet into one piece; and a head portion of the upper sheet and a head portion of the lower sheet are disposed to be separated from and staggered with each other in a moving direction of the movable contacts so that the upper sheet and the lower sheet are staggered.

2. The staggered double movable contact spring as claimed in claim 1, wherein the head portion of the movable contact spring body is bisected into the upper sheet and the lower sheet which have the same width as each other.

3. The staggered double movable contact spring as claimed in claim 1, wherein the head portion of the movable contact spring body is divided into the upper sheet and the lower sheet which have different widths from each other, and a longitudinal arced portion is disposed on one of the upper sheet and the lower sheet that has a larger width.

4. The staggered double movable contact spring as claimed in claim 3, wherein a lateral through-slot is formed in the longitudinal arced portion disposed on the sheet that has a larger width.