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RELAY WITH A CENTRAL, COAXIAL CORE MAGNETIZABLE WITH THE RELAY COIL CONDUCTOR

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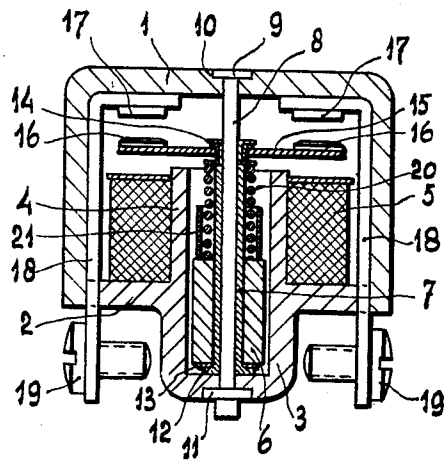

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RELAY WITH A CENTRAL, COAXIAL CORE MAGNETIZABLE WITH THE RELAY COIL CONDUCTOR

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This invention relates to a relay having a central, coaxial core magnetizable with the relay-coil, which core is slidably mounted on an electrically insulated sleeve on which is carried a bridging contact member and about which is disposed a coil spring interposed between the core and bridging contact member. Such relays are especially useful (though not limited to such use) as the starting relay for small electrical motors.

Many previous motor-starting relays of the above-mentioned type have the disadvantage and drawback that the relay is not free of armature spring back upon actuation of the relay, which spring back or bounce may lead to injury of the contacts through sparking and other undesirable phenomena when the electrical motor is energized.

Applicant has found that the cause of the above mentioned disadvantages and drawbacks present in the above mentioned previous relay constructions lies in the fact that the contact bridge during the switching operation is influenced by the weight of the redescending armature, which causes contact separation, during which operation the undamped coil spring also experiences rapid vibration, which is transmitted to the contact bridge during the switching operation.

Among the several objects of the invention is the provision of a relay which will obviate or at least minimize the above mentioned disadvantages and drawbacks.

Other objects will be in part apparent and in part pointed out hereinafter.

According to the invention the bridging contact member is freely rotatable about and also limited-oscillatable about an end of a guide tube extending through the core. This provides the advantage that the two bridging contacts can adapt themselves to the corresponding stationary contacts of the relay, while the fairly relaxed spring disposed about the tube sufficiently assures that the contact bridge with the two contacts, whose mass is relatively small, does not exhibit a tendency to spring back upon closing of the contacts.

Further, according to the invention, the guide tube may consist of plastic, for example, nylon. The tube at one end thereof is provided with a double flange thereto for mounting the bridging contact member as described above. The other end of the tube is provided with a single flange for supporting the core which is provided with a central bore. The present invention advantageously affords provision of a relay of very suitable and inexpensive construction.

Moreover, according to the invention, the coil spring disposed about the guide tube may be surrounded over a part of its length by a sleeve serving to damp the spring action. It has been found that through this measure there is obtained a relay construction which is substantially wholly free of undesirable recoil of the armature.

The invention will now be further described with reference to the drawing in which there is represented in axial section a model of a relay according to the invention.

The represented relay has a two-part housing, of which part 1 is in the form of a cap, while part or base 2 is substantially disc-like in form. The latter part has a central, outwardly-extending cylindrical part 3, which continues on the other side of the disk or base 2 in a likewise

cylindrical part 4, which extends into the interior of cap or housing 1, when the parts are assembled as shown in the drawing. A magnet coil 5 is disposed about the cylindrical part 4 as shown.

Disposed in the cylindrical bore formed by the parts 3 and 4 is a magnetizable core or armature 6, which has a central bore, through which stem means in the form of a tube 7, formed of an electrically insulating material, preferably of nylon, can freely move. This tube is freely slidably mounted on a pin 8, which is telescopically received within tube 7 as shown. One end of pin 8 extends through the central part of the cap 1, and is provided with a head 9, which rests in a cavity 10, provided in cap 1, as shown. The other end of the pin 8 extends centrally through the projecting part 3, and is provided with a bushing 11 clamped thereabout. In this way the parts 1 and 2 of the housing are rigidly held together.

The end of tube 7 which extends into the cylindrical part 3 is provided with a flange 12, which supports the core 6 thereon, which core is telescopically disposed about tube 7 as shown. A fiber ring 13 is disposed intermediate the flange 12 and the core 6 as shown. The other end of the tube 7 is provided with a double flanged member 14, telescopically disposed about tube 7 and fixedly secured thereto and received in a groove provided by tube 7, over which a flange nipple is pushed, as shown. The double flanged member 14 also supports a bridging contact member 15 which carries movable contacts 16 as shown. Member 14 is received within a centrally located aperture in the bridging member 15 which is of such a size that the contact bridge can rotate freely about the tube 7 and also can limitedly oscillate thereabout.

The stationary contacts 17 of the relay are disposed opposite the movable contacts 16 at the inner side of the end wall of the cap 1 and are conductively connected through strips 18 with the terminals 19, which extend exteriorly of the housing of the relay.

A coil spring 20 is telescopically disposed about the tube 7 intermediate the double flange 14 and the core 6.

A portion of the length of coil spring 20 is surrounded by a tubular sleeve 21, the inner surface of which frictionally engages the outer surface of spring 20. Sleeve 21 preferably is formed of plastic, and is for the purpose of partly damping the action of the spring 20 upon actuation of the relay and particularly upon actuation of the armature. It will also be noted that the location of the tube 21 partially along the length of the stem prevents total compression of the spring 20 upon movement of the armature. This dampening action in combination with the rotatable and oscillatable mounting of the bridging contact member 15, as well as the prevention of complete compression of spring 20 cooperates to obviate or at least considerably minimize recoil or bouncing of the armature upon actuation of the relay.

It is to be understood that the execution of the above-described relay may be modified in many manners without thereby departing from the framework of the invention.

I claim:

1. A bridging contact plunger type subassembly comprising stem means formed of electrically insulating material; a magnetic armature slidably mounted on said stem means; a bridging contact member mounted on said stem means adjacent one end thereof for rotation and limited oscillatory movement with respect to said stem means; spring means telescopically disposed about said stem means intermediate said armature and bridging contact member and a tubular sleeve member telescopically disposed about and frictionally engaging said spring means over a part of its length for at least partially damping the spring action of said spring means.

2. The subassembly as set forth in claim 1 and wherein

said stem means comprises a cylindrical sleeve which is telescopically received within an aperture provided by said armature and said spring means comprises a coil spring.

3. The subassembly as set forth in claim 2 and including a double flanged member fixedly secured to said one end of said stem means and mounting said bridging contact member thereon intermediate the flanges thereof to permit rotary and oscillatory movement of said bridging contact member with respect to said stem.

4. An electrical switch comprising a housing; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including a stem means; a magnetic armature mounted on said stem means and associated in a magnetic circuit with said coil; a bridging contact member mounted on said stem means; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; spring means telescopically disposed about said stem means urging said bridging contact member for movement in one direction; and a tubular sleeve member telescopically disposed about and frictionally engaging said spring means over a part of its length to at least partially damp the spring action of said spring means.

5. An electrical switch comprising a housing; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including stem means formed of electrically insulating material; a magnetic armature slidably mounted on said stem means and associated in a magnetic circuit with said coil; a bridging contact member mounted on said stem means; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; spring means telescopically disposed about said stem means intermediate said armature and bridging contact member and a tubular sleeve member telescopically disposed about said spring means over a part of its length for at least partially damping the spring action of said spring means.

6. An electrical switch comprising a housing; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including stem means formed of electrically insulating material; a magnetic armature slidably mounted on said stem means and associated in a magnetic circuit with said coil; a bridging contact member mounted on said stem means adjacent one end thereof for rotation and limited oscillatory movement with respect to said stem means; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; spring means telescopically disposed about said stem means intermediate said armature and bridging contact member and a tubular sleeve member telescopically disposed about said spring means over a part of its length for at least partially damping the spring action of said spring means.

7. An electrical switch comprising a housing; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including a cylindrical sleeve formed of electrically insulating material; a magnetic armature slidably mounted on said sleeve and associated in a magnetic circuit with said coil; a double flanged member fixedly secured to said sleeve adjacent one end thereof; a bridging contact member mounted on said double flanged member intermediate the flanges thereof for rotation and limited oscillatory movement with respect to said sleeve; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; a coil spring telescopically disposed about said sleeve intermediate said armature and bridging contact member; and a tubular member telescopically disposed about said spring over a part of its length for at least partially damping the spring action of said spring.

8. An electrical switch comprising a housing having first and second casing members; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including a cylindrical sleeve formed of electrically insulated material; a magnetic armature slidably mounted on said sleeve and associated in a magnetic circuit with said coil; a bridging contact member mounted on said sleeve; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; spring means telescopically disposed about said sleeve urging said bridging contact member for movement in one direction; a tubular member telescopically disposed about said spring means over a part of its length for at least partially damping the spring action of said spring means; and a pin member extending through said sleeve and through openings in said first and second casing members fixedly securing said casing members together.

9. An electrical switch comprising a housing; a pair of spaced stationary electrical contacts mounted in said housing; said switch including a coil; a bridging contact plunger-type subassembly disposed within said housing; said subassembly including a cylindrical sleeve formed of electrically insulating material; a magnetic armature slidably mounted on said sleeve and associated in a magnetic circuit with said coil; a double flanged member fixedly secured to said sleeve adjacent one end thereof; a bridging contact member mounted on said double flanged member intermediate the flanges thereof for rotation and limited oscillatory movement with respect to said sleeve; said bridging contact member carrying a pair of movable electrical contacts positioned for engagement with said stationary contacts; a coil spring telescopically disposed about said sleeve intermediate said armature and bridging contact member; a tubular member telescopically disposed about said spring over a part of its length for at least partially damping the spring action of said spring; and a pin member extending through said sleeve and through openings in said first and second casing members fixedly securing said casing members together.

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