Aug. 22, 1961 R. E. CALLAWAY 2,997,560

HIGH SPEED RELAY

Filed April 30, 1959

FIG. 1

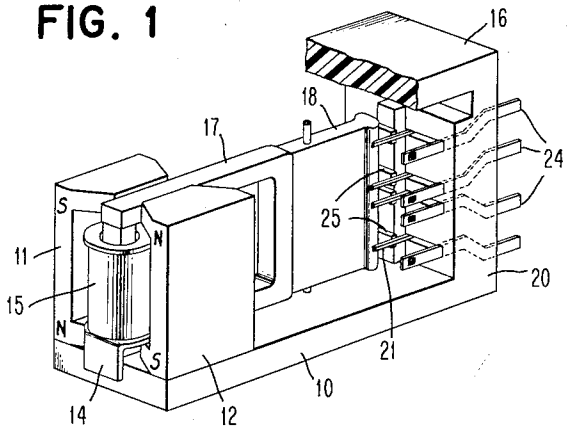


FIG. 2

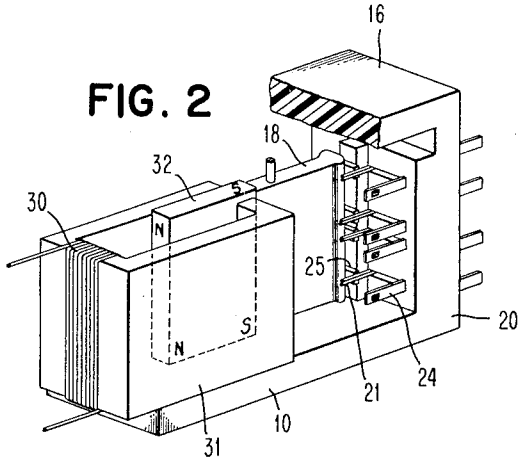
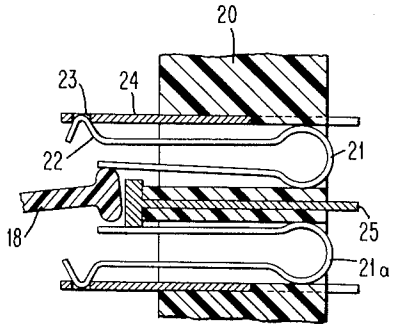


FIG. 4



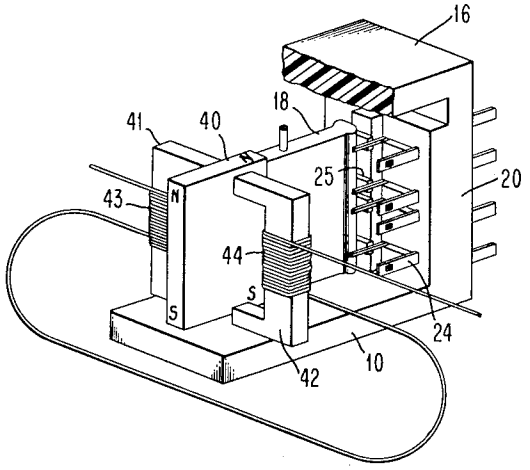


FIG. 3

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United States Patent Office 2,997,560 Patented Aug. 22, 1961

2,997,560

HIGH SPEED RELAY

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Filed Apr. 30, 1959, Ser. No. 810,036
9 Claims. (Cl. 200—93)

This invention relates to relays and more particularly to multicontact polarized relays of the locking type.

There are many forms of polarized relay, many of them locking up but none are of the multicontact variety better known as the permissive make relay. In this form of relay the contacts are of the wire variety and are biased to make contact. The armature is adjusted to hold the contacts open, when in the normal or unoperated position. When actuated the armature permits the contacts to close or make contact thus the name permissive make. A relay having permissive make contacts is disclosed in a patent to H. M. Knapp 2,472,709.

In order to hold the contacts of this form of relay closed after the actuating circuit is opened some form of mechanical latching means for the armature is usually provided. This usually requires a second coil with another armature to unlatch the first armature.

It is therefore the principal object of this invention to provide a permissive make relay in which permanent magnets are used to latch the armature in operated position.

A further object is to provide a polarized relay of the permissive make type in which the operation is sped up by the use of permanent magnets.

Another object is to provide a relay of the permissive make type having a plurality of contacts.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is an isometric view of the preferred form of the invention.

FIG. 2 is an isometric view of a modified form of the invention.

FIG. 3 is an isometric view of a further modified form.

FIG. 4 is an enlarged detail cross section of the contact construction.

The preferred form of the invention is shown in FIG. 1. Mounted on a base **10** are two U-shaped permanent magnets **11** and **12**. On a bracket **14** secured to the base **10** is a hollow magnet coil **15**. Pivotally mounted in the base **10** and in an upper arm **16** of the base is an O-shaped armature **17** having a finger **18** of plastic or any well known form of insulation secured thereon. Formed on base **10** is an upright **20** of (FIG. 4) insulating material in which spring contacts **21** are positioned as shown. The contacts **21** are bifurcated, one leg bearing against the finger **18** and the other has a kink **22** formed therein which cooperates with a notch **23** in a contact bar **24** anchored in the upright or contact holder **20**. Also anchored in the holder is a T-shaped contact **25** with which the contact **21** and its counterpart **21***a* cooperate. As shown in FIG. 4 when the armature is rocked about its pivot point the member **18** opens contact **21** and permits contact **21***a* to make contact with contact **25** as

shown in FIG. 4. When the member **18** is swung in the opposite direction contact **21***a* will be opened and contact **21** permitted to make.

The permanent magnets are mounted with the north pole of one facing the south pole of the other so that when the coil **15** is energized in one direction the armature **17** will be swung toward the reader and into engagement with the permanent magnet **12** where it will be latched until the coil **15** is energized in an opposite direction. When this occurs the magnet **12** will repel the armature and accelerate its movement toward the magnet **11** where it will again be held by magnetic action.

In FIG. 2 is a modification of the invention in which the coil **30** is substituted for coil **15** and is wound on a U-shaped core **31** between the inturned ends of which is positioned an armature **32**. The armature is a permanent magnet the poles of which extend vertically with respect to the axis of the armature and parallel to the winding of the coil **30**. In this form current in one direction in the coil **30** will make arm **31** of the core a north pole which will attract the armature.

FIG. 3 shows a further modification of the relay which is a reversal of the component of FIG. 1. The armature **40** is now a permanent magnet positioned between two U-shaped cores **41** and **42** having individual coils **43** and **44** wound thereon.

Coils **43** and **44** are wound in reverse direction to one another and connected in series so that a current flowing in one direction will make the upper part of core **42** a north pole and the lower part a south pole and the core **41** will be polarized in an opposite direction. This will cause core **41** to attract the armature **40** and latch it up while core **42** will repel the armature speeding up its action.

From the above it is apparent that by the provision of permanent magnets either in the armature or adjacent thereto and reversing the current flow in the operating coil a simple and efficient polarized latching relay having a plurality of contacts is provided.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. In a polarized relay, a frame, an armature pivotally mounted within said frame, a hollow coil secured to said frame within which is a member of said armature is positioned for reciprocating movement, a pair of individual permanent magnets mounted on said frame with relation to said armature having their magnetic poles opposing, a plurality of stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said armature and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said armature, said coil being adapted when energized to create a magnetic flux in said armature and magnets such that said armature will be repelled by one of said permanent magnets and attracted by the other of said magnets to rock said armature to permit one set of movable contacts to make and be retained made after said coil is de-energized.

2. In a polarized relay, a frame, an armature in the form of a hollow square pivotally mounted within said frame, a hollow coil secured to said frame within which a vertical member of said armature is positioned for reciprocating movement, a pair of individual permanent magnets mounted on said frame the poles of said magnets being located in opposing relation to the horizontal arms of said armature, a plurality of stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said armature and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said armature, said coil being adapted when energized to create a magnetic flux in said armature and magnets such that said armature will be repelled by one of said permanent magnets and attracted by the other of said magnets to rock said armature to permit one set of movable contacts to make and be retained made after said coil is de-energized.

3. In a polarized relay, a frame, an armature in the form of a hollow square, a T-shaped contact actuating member secured to said armature and pivotally mounted within said frame, a hollow coil secured to said frame within which a vertical member of said armature is positioned for reciprocating movement, a pair of individual C-shaped permanent magnets mounted on said frame with relation to the horizontal arms of said armature having their magnetic poles opposing, stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said contact actuating means and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said contact actuating means, said coil being adapted when energized to create a magnetic flux in said armature and magnets such that said armature will be repelled by one of said permanent magnets and attracted by the other of said magnets to rock said contact actuating means to permit one set of movable contacts to make and be retained made after said coil is de-energized.

4. In a polarized relay, a frame, an armature pivotally mounted within said frame, said armature comprising a permanent magnet with the magnetic poles thereof located perpendicular to the axis of rotation of said armature, a core of magnetizable material in the form of a hollow square having a slot therein to acommodate said armature, a coil wound on said core, a plurality of stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said armature and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said armature, said coil being adapted when energized to create a magnetic flux in said core and armature whereby said armature will be repelled to rock said armature to permit one set of movable contacts to make and retain said contacts made after said coil is de-energized.

5. In a polarized relay, a frame, an armature comprising a permanent magnet and a contact actuating means pivotally mounted within said frame, the magnetic poles of said armature being located perpendicular to the axis of rotation thereof, a core of magnetizable material in the form of a hollow square having a slot therein to accommodate said armature, a coil wound on said core, a plurality of stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said contact actuating means and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said contact actuating means, said coil being adapted when energized to create a magnetic flux in said core whereby said armature will be repelled to rock said armature and contact actuating means to permit one set of movable contacts to make and retain said contacts made after said coil is de-energized.

6. In a polarized relay, a frame, an armature comprising a permanent magnet and a contact actuating means of nonmagnetic material pivotally mounted within said frame, the magnetic poles of said armature being located perpendicular to the axis of rotation thereof, a C-shaped core of magnetizable material adapted to accommodate said armature between the arms thereof, a coil wound on the base of said core, a plurality of stationary contact members positioned in said frame adjacent the free end of said contact actuating means, resilient wires forming the movable contacts of said relay, said wires being mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said contact actuating means and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said contact actuating means, said coil being adapted when energized to create a magnetic flux in said core and armature whereby said armature will be repelled to rock said armature and contact actuating means to permit one set of movable contacts to make said permanent magnet in said armature and retaining said contacts made after said coil is de-energized.

7. In a polarized relay, a frame, an armature pivotally mounted within said frame, said armature comprising a permanent magnet the magnetic poles of which are located parallel to the axis of rotation of said armature, a substantially U-shaped core secured to said frame in opposing relation on each side of said armature, a coil on each core wound in the same direction and connected in series, a plurality of stationary contact members positioned in said frame, resilient wires forming the movable contacts of said relay mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said armature and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said armature and said coils being adapted when energized to create a flux path through said armature and cores whereby with a current flow in one direction said armature will be repelled by one of said cores and attracted by the other to rock said armature to permit one set of movable contacts to make and be retained made after said coils are de-energized.

8. In a polarized relay, a frame, an armature pivotally mounted within said frame, said armature comprising a permanent magnet the magnetic poles of which are located parallel to the axis of rotation of said armature and a contact actuating means of nonmagnetic material, a substantially U-shaped core secured to said frame in opposing relation on each side of said armature, a coil on each core wound in the same direction and connected in series, a plurality of stationary contact members positioned in said frame adjacent the free end of said contact actuating means, resilient wires forming the movable contacts of said relay, said wires being mounted in said frame in pairs on opposite sides of and in substantially parallel relation to said contact actuating means and said stationary contacts, said wires being biased to make contact with said stationary contacts when permitted by said contact actuating means, said coils being adapted when energized to create a flux path through said armature and cores whereby with a current flow in one direction said armature will be repelled by one of said cores and attracted by the other to rock said contact actuating means to permit one set of movable contacts to make and be retained made after said coils are de-energized.

9. In a polarized relay, a frame, an armature pivotally mounted within said frame, said armature comprising a permanent magnet the magnetic poles of which are located parallel to the axis of rotation of said armature and a contact actuating means of nonmagnetic material, a substantially U-shaped core secured to said frame in

opposing relation on each side of said armature, and a coil on each leg of said core wound in the same direction and connected in series, said coils being adapted when energized to create a flux path through said armature and core legs whereby with a current flow in one direction said armature will be repelled by one of said legs and attracted by the other to rock said armature into a position to be retained by said permanent magnet after said coils are de-energized.

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