April 5, 1966 T. E. MYERS 3,244,836

LATCHING RELAY

Filed Aug. 21, 1964

Fig. 1.

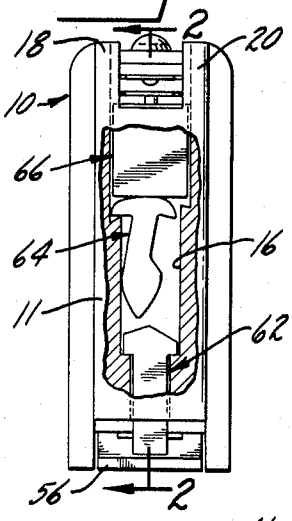


Fig. 2.

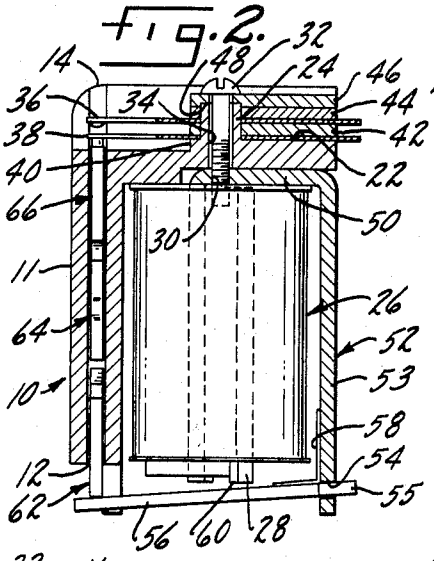


Fig. 3.

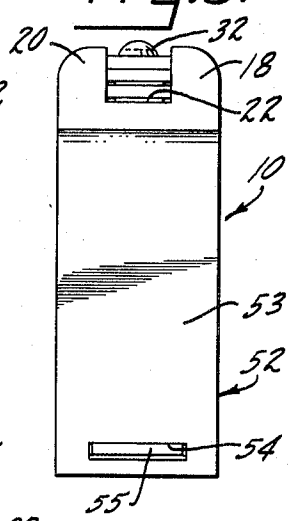


Fig. 4.

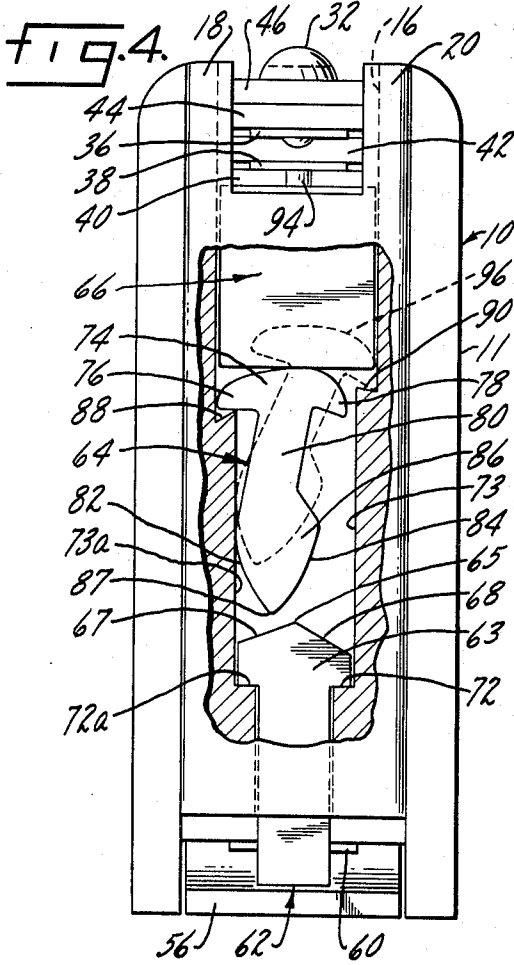
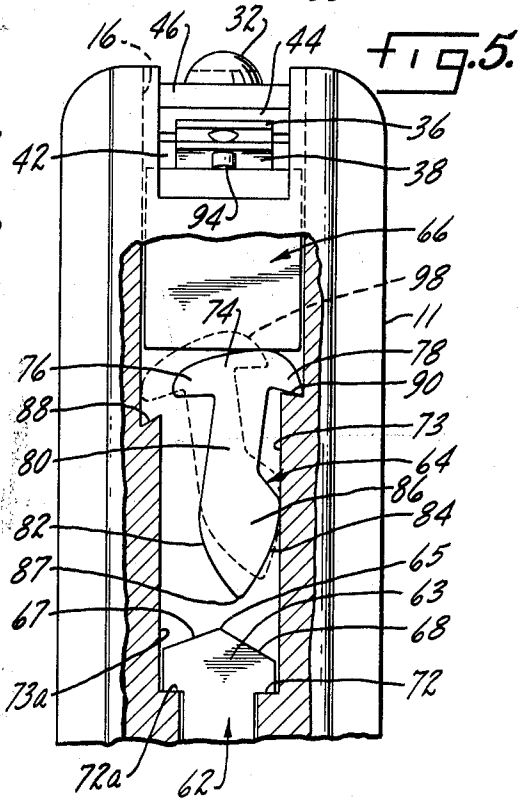


Fig. 5.



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LATCHING RELAY

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10 Claims. (Cl. 200—109)

This invention relates to a latching relay in which the relay contacts are held in a closed position by mechanical means.

A primary purpose of the invention is a latching relay of the type described in which a movable pawl is held in one of two positions by spaced shoulders, the pawl being moved from one position to another by a reset element having cam surfaces which cooperate with cam surfaces on the pawl.

Another purpose is a simply constructed reliably operable latching relay of the type described.

Another purpose is a positively operating latching relay utilizing a minimum of parts in the mechanical latching arrangement.

Another purpose is a latching relay of the type described utilizing an axially movable plunger to close and open the relay contacts.

Another purpose is a latching relay having a pair of elements with cooperating cam surfaces for locking and unlocking the relay contacts.

Other purposes will appear in the ensuing specification, drawings and claims.

The invention is illustrated diagrammatically in the following drawings wherein:

FIGURE 1 is a front elevational view of the latching relay with parts removed to show a portion of the latching mechanism;

FIGURE 2 is a view partly in section along line 2—2 of FIGURE 1;

FIGURE 3 is a rear elevational view;

FIGURE 4 is a view similar to FIGURE 1, but on an enlarged scale to illustrate the movement of the latch; and

FIGURE 5 is a view similar to FIGURE 4 to illustrate another operation of the latching mechanism.

Use of the same numerals in the different views will be a reference to the same structures and elements.

A latch holder or body section shown generally as **10** has a side body member **11** which has a bottom opening **12**, a top opening **14** and a passageway or locking channel **16** extending to both openings. The body section **10** has a top member which in the form shown has a pair of spaced sidewalls **18** and **20**, a floor **22** therebetween, and an integral boss **24** projecting from the floor.

An electromagnetic coil shown generally as **26** is positioned below the top member, and this coil includes the usual core **28** having a threaded opening **30** engaged by screw **32** which passes through bore **34** in the boss. This screw also locks reed contacts **36** and **38** between the raised portion **40** of the top member and insulating plates **42** and **44**. The reed springs **36** and **38** are normally biased to an open position. A top plate **46** is shown with a counterbore **48** which allows plate **46** to abut insulating plate **44** on the side of boss **24**. Plates **42**, **44** have openings to fit around the boss, and top locking plate **46** has an opening through which screw **32** passes.

The core shown herein is formed from a strip extending from the top **50** of an angled plate **52**. The strip is bent downwardly and formed into the rounded core shape. Plate **52** has a side **53** with a slot **54** to receive in rocking relationship tongue **55** of armature **56**. A flat angled spring **58** may be used to urge the armature away from the end **60** of the core.

The armature or actuating member **56** is adapted to be attracted to the end of the core when the coil is energized. Such an action will move a reset element shown generally as **62** into contact with a latch shown generally as **64**, and latch **64** raises plunger **66** which then moves reed **38** against reed **36** to thereby close the contacts. The reed spring **38** normally urges plunger **66** downwardly.

The details of the latching mechanism will be better understood by reference to FIGURES 4 and 5. The reset element or index **62** has a head **63** with point **65**, a high face **67** and a low face **68**. The faces form different angles to an imaginary line running along the longitudinal axis of the reset element. In the active position, the head **62** rests on stops at shoulders **72**, **72***a*, extending from side walls or guides **73**, **73***a* which define the passageway or locking channel **16**.

The latch or pawl has a head **74** with lateral arms **76** and **78**. The body **80** of the pawl is shown joining the head at an angle, and the foot **86** of the pawl has cam surfaces **82** and **84**. These cam surfaces extend upwardly from point **87** at the foot of the pawl and are adapted to ride against either sidewall **73** or **73***a*. Arms **76**, **78** of the pawl are adapted to engage and be seated upon offset shoulders **88** and **90** provided in the sidewalls or guides **73**, **73***a* of the locking channel or passageway. Shoulders **88** and **90** are shown undercut, and shoulder **88** more so. When arm **76** is seated on lower shoulder **88**, as shown in FIGURE 4, the latch mechanism is in an inactive position and the contact reeds **36**, **38** are in the open position. When arm **78** is seated on higher shoulder **90**, as shown in FIGURE 5, the head **74** has moved plunger **66** upwards so that element **94** on top of plunger **66** closes contacts **36**, **38**. The movement of reset element **62** will cause the latch or pawl **64** to successively change its lateral position on each contact with the reset element as indicated by phantom outline **96** in FIGURE 4 and phantom outline **98** in FIGURE 5.

The use, operation and function of the invention are as follows:

The latching relay shown herein uses a mechanical arrangement to hold the relay contacts in either an open or closed position. The relay shown may have a wide variety of uses, for example controlling electric lights, electric motors, or any other type of control function in which a pair of relay contacts is to be closed and held in the closed position after receipt of a first pulse, and then opened and held in an open position after receipt of a second pulse, with the sequence of operation repeating upon the receipt of successive pulses.

Assuming that the contacts are in the open position, and the pawl is in the position of FIGURE 4, when the electromagnet **26** receives a pulse of current armature **56** will move in an upward direction to move reset element **63** toward the pawl. Cam surface **67**, which as shown herein is generally straight, will contact somewhat arcuate cam surface **84** on the pawl to swing the pawl in a clockwise direction as it moves the pawl upward. Arm **76** will be moved off should **88**. The pawl will move upwardly and will push plunger **66** ahead of it to close the contacts. After the armature has moved away from the reset element, indicating a drop in current or the end of the current pulse supplied to the electromagnet, the pawl will be in the dotted line position of FIGURE 4 and the relay contacts will be held in a closed position.

Upon the receipt of the next pulse of current, the armature will again be moved upward and reset element will move up to contact the pawl. Cam surface **68** on the reset element, which is again generally straight, will contact the somewhat arcuate cam surface **82** on the pawl to swing the pawl laterally or in a counterclockwise direction. Once the reset element drops, the pawl will drop as its arm **78** will have moved off shoulder **90**. The pawl will then be held by shoulder **88**.

The invention should not be limited to a relay arrangement in which the channel is offset to one side of the electromagnet. The elements described and shown can also be concentric with the axis of the electromagnet. Other satisfactory arrangements are also possible.

The material forming the contact elements should be sufficiently flexible so that the contacts may be easily closed when the plunger **66** moves upwardly and so that the contacts will immediately spring apart once the plunger moves down.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there are many modifications, substitutions and alterations thereto within the scope of the following claims.

I claim:

1. In a latching relay, a housing, a pair of normally open contacts on said housing, an electromagnet in said housing, an armature mounted on said housing, spring means urging said armature away from said electromagnet, a channel in said housing adjacent said contacts, a pawl positioned for movement in said channel, means in said channel for holding said pawl in a first fixed position in which the pawl is effective to hold the contacts in a closed position, and to hold said pawl in a second fixed position in which the contacts remain in an open position, and a reset element in said channel positioned for contact by said armature and pawl, said reset element and pawl having cooperating cam surfaces whereby said reset element moves said pawl from one of said two fixed positions to the other for each operation of said armature.

2. The structure of claim **1** further characterized by a pair of spaced shoulders in said channel, said pawl having arms positioned for contact with said shoulders to hold said pawl in one or other of said two positions.

3. The structure of claim **1** further characterized and including a plunger in said channel positioned between said contacts and said pawl, movement of said pawl in said channel being effective to move said plunger toward and away from said contacts.

4. The structure of claim **1** further characterized in that said reset element is effective to axially move the pawl in the channel, with the cooperating cam surfaces causing said pawl to swing laterally in the channel as it moves axially.

5. In a latching relay, a housing, a pair of normally open relay contacts on said housing, an electromagnet in said housing, an armature mounted on said housing, spring means urging said armature away from said electromagnet, a pawl positioned for movement toward and away from said contacts, means on the housing for holding said pawl in a first fixed position in which the pawl is effective to hold the contacts in a closed position and to hold said pawl in a second fixed position in which the contacts remain in an open position, a reset element positioned to contact said pawl and positioned for contact by said armature, said reset element and pawl having cooperating cam surfaces whereby said reset element moves said pawl from one of two said fixed positions to the other for each operation of the armature.

6. The structure of claim **5** further characterized in that said reset element is effective to axially move the pawl, with the cooperating cam surfaces causing said pawl to swing laterally as it moves axially.

7. The structure of claim **6** further characterized in that the cam surfaces on the pawl are slightly arcuate, with the cam surfaces on the reset element being generally straight.

8. The structure of claim **5** further characterized in that said reset element and pawl are in axial alignment.

9. The structure of claim **5** further characterized in that the means on the housing for positioning the pawl include a pair of shoulders spaced different distances from the contacts.

10. The structure of claim **9** further characterized in that said pawl includes a pair of laterally extending arms adapted to seat on said shoulders.

No references cited.

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