July 30, 1963 J. SCHEIB, JR 3,099,734

ELECTRICAL RELAY

Filed March 24, 1960

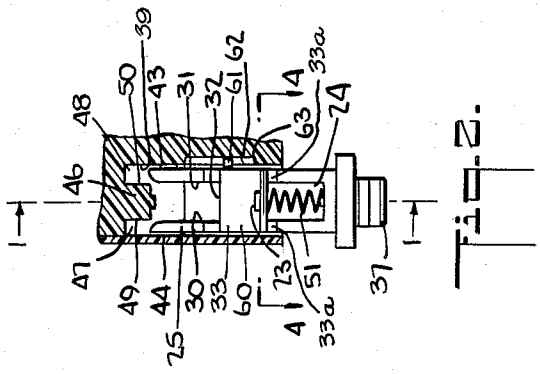


Fig. 2.

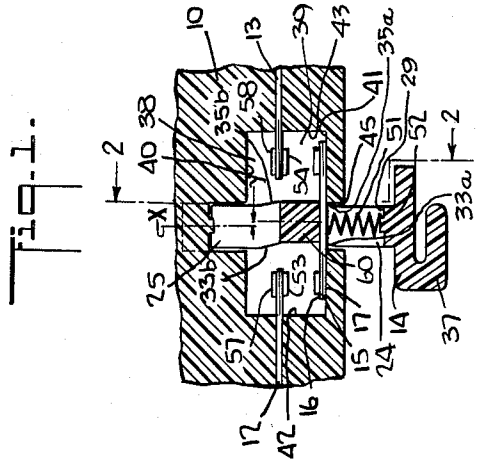


Fig. 1.

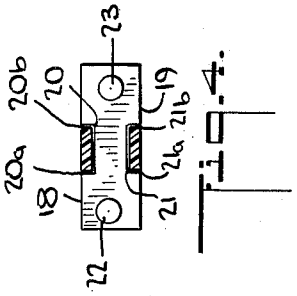


Fig. 4.

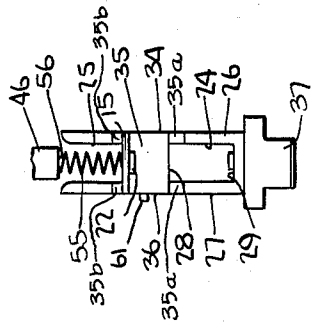


Fig. 3.

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ELECTRICAL RELAY

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1 Claim. (Cl. 200—166)

This invention relates to electrical relays and is directed particularly to the mounting of a movable contact bar for connecting two spaced stationary contacts.

This application is a continuation in part of my application Serial No. 741,347, filed June 11, 1958, entitled Electrical Multipole Control Relays.

An object of this invention is to provide a wiping action between the contacts of a movable contact bar and spaced fixed contacts.

Another object of the invention is to provide a transverse movement between a contact bar and the supporting plunger actuating the contact bar.

Other and further objects of the invention will become apparent from the following description taken in connection with the drawings, in which

FIG. 1 is a fragmentary sectional view of the stationary supporting casing and the plunger slidably mounted therein taken along lines 1—1 of FIG. 2;

FIG. 2 is a side view of the plunger and a fragmentary sectional view of the casing associated with the plunger taken along lines 2—2 of FIG. 1;

FIG. 3 is another side view of the plunger and a fragment of the casing to illustrate the mounting of the contact bar in the normally closed position; and

FIG. 4 is a sectional view of the plunger taken along lines 4—4 of FIG. 2 to illustrate a top view of the contact bar.

Referring to the drawings, a fragment of an insulating contact casing **10** secured in a fixed position is illustrated. The casing **10** supports fixed contacts **12** and **13** and slideably guides a plunger **14**. The plunger **14** has a contact bar **15** for engaging and electrically connecting the fixed contacts **12** and **13**.

The movable contact bar **15** of electrically conductive metal is preferably formed in a thin flat shape with an upper surface **16** and a lower surface **17**. The contact bar has side edges **18** and **19** with notches **20** and **21**. On opposite ends of the surface **16** contact buttons **22**, **23** are attached to the contact bar.

The plunger, preferably made of a light insulating plastic material, has a rectangular cross section and two slots **24** and **25** extending transversely through the plunger. The slot **24** has opposite side walls **26** and **27** and a top wall **28** and bottom wall **29**. The slot **25** has opposite side walls **30** and **31** and a bottom wall **32**. The upper end of the slot **25** opposite to the bottom wall **32** is open so that the upper portion of the plunger has a generally U shape for reasons later explained herein. The plunger has outer side walls **33**, **34**, **35** and **36**. At the bottom end of the plunger a generally U-shaped connecting means **37** is provided for interleaving with a member not shown actuated by a solenoid or other suitable actuating means.

The casing **10** has a chamber **38** enclosed by the side wall **39**, top wall **40**, bottom wall **41** and end walls **42**, **43**. A removable piece **44** is detachably secured to the casing **10** to close the side of the chamber **38** opposite the side wall **39**. The means for securing the removable piece **44** to the casing **10** are not shown and may be any suitable attaching means. The plunger **14** is slideably mounted in the chamber **38** and extends into the casing through the opening **45**. The plunger is guided by the removable piece **44**, side wall **39** and the projection **46** formed by grooves **47**, **48** in the top wall **40**. The U-shaped ends of the plunger fit into the grooves **47**, **48** so that the side surfaces **30** and **31** slideably engage the surfaces **49** and **50** of the projection **46**. The portion of the bottom wall **41** forming the slot **45** also guides the plunger **14**.

In FIG. 1 the contact bar **15** is positioned in the lower slot **24**. A spring **51** seated against the bottom wall **29** and around the knob **52** engages the surface **17** of the contact bar to press the contact bar upwardly toward the fixed contacts **12** and **13**. The contact bar **15** is in a normally open position. On actuation of the plunger the contact bar **15** is forced into engagement with the fixed contacts **12** and **13**, with the buttons **22** and **23** engaging buttons **53** and **54** of the fixed contacts **12** and **13** respectively. The compressed spring **51** holds the contact buttons **22** and **23** under proper contact pressure with the buttons **53** and **54** to pass electric current therebetween. On the downward disengaging movement of the plunger, the spring **51** tends to maintain contact for a short period until the contact bar **15** is engaged by the top wall **28** and then is drawn downwardly by the top wall **28** to disengage the contact bar **15** from the fixed contacts **12** and **13**.

As illustrated in FIG. 3 the contact bar **15** may be alternatively mounted in the slot **25**. The contact bar is held against the bottom wall **32** by means of a helical spring **55** which is seated against the projection **46** and around the knob **56**. The buttons **22** and **23** engage the buttons **57** and **58** on the tops of the contacts **12** and **13**.

In each instance the notches **20** and **21** in the contact bar **15** fit around the plunger and engage the side surfaces **33** and **35**. The plunger has an axis X and the central portion **60** is offset a distance Y. This provides upper slopes or ramps on the side surfaces **33** and **35** which impart a transverse movement to the movable contact bar. Adjacent the slot **24**, the side **33** has sloped surface **33***a* and the side **35** has sloped surface **35***a*. The surfaces **20***a* and **21***a* engage the sloped surface **33***a* and the surfaces **20***b* and **21***b* engage the sloped surface **35***a*. Thus as the contact bar **15** engages the fixed contacts **12** and **13** by the upward movement of the plunger, the relative axial movement of the contact bar **15** and the plunger causes the contact bar **15** to also move transversely to produce a wiping action between the buttons **22** and **53** and **23** and **54**. After the buttons are in firm engagement, the transverse action ceases since the walls **33** and **35** are parallel to the axis of the plunger. Thus further movement of the plunger does not produce any transverse movement.

When the contact bar is mounted in the slot **25** as illustrated in FIG. 3, the bar is normally held in closed position by spring **55**. In the normal position the contact bar **15** is spaced from the bottom wall **32**. When the plunger **14** is actuated it is raised and the bottom wall **32** engages the bar **15** and lifts it out disconnecting the bar from the fixed contacts. The sloped walls **33***b* and **35***b* lead the surface **32** to impart a transverse motion to the contact **15** just prior to disengagement to produce a wiping action between the button contacts. The contact bar **15** is then raised and the spring **55** further compressed. On re-engagement a transverse movement is again imparted to the contact bar **15** by the walls **33***b* and **35***b* to produce a wiping action on the contacting of the buttons.

The contact bar **15** is inserted in the slot **24** by turning the contact bar **15** edgewise and passing it through the slot **24** and then twisting it to seat against the surface **28**. The contact bar may be inserted through the upper end of the slot **25** and the combined contact bar and plunger assembly fitted sidewise into the chamber **38** and then

raised to overlap the projection **46** and the U-shaped end of the plunger.

On the outer side wall **36** of the plunger **15** a pin **61** is provided fitting in the slot **62** extending parallel to the axis X of the plunger. The pin **61** engages the bottom ledge **63** of the slot to prevent the plunger from dropping out of the casing **10** when the contact bar **15** is positioned in the upper slot **25**.

Various modifications may be made in the foregoing embodiment without departing from the invention as set forth in the appended claim.

I claim:

In an electrical switch having two laterally spaced fixed contacts and a movable contact bar having two contacts for engaging a respective fixed contact and transferring current therebetween on engagement, a casing supporting said fixed contacts in laterally spaced relation, a contact carrier mounted in said casing betwen said fixed contacts to move in relation to said fixed contacts and having outer side surfaces, said contact carrier having a slot extending laterally therethrough and extending longitudinally therein to permit longitudinal movement of said bar, resilient

means urging said contact bar against the end of said slot, said bar having side edges extending longitudinally to the common center line of said contacts and notches in said edges for engaging said outer side surfaces to laterally position said bar on movement in said slot, said outer side surfaces having portions sloped at an angle to the longitudinal axis of said contact carrier adjacent to a respective slot and only adjacent the end of a respective slot engaged by the movable contact bar on full expansion of said resilient means for engaging said contact bar on movement in a respective slot to move the contact bar transversely to the longitudinal movement to wipe said contact of the movable bar across the fixed contacts on engagement and disengagement of the movable contact bar with the fixed contacts.

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