June 26, 1962 M. L. FROLAND 3,041,433

CONNECTING DEVICE FOR COUPLING RESET PLUNGERS

Filed Dec. 23, 1959

Fig. 1

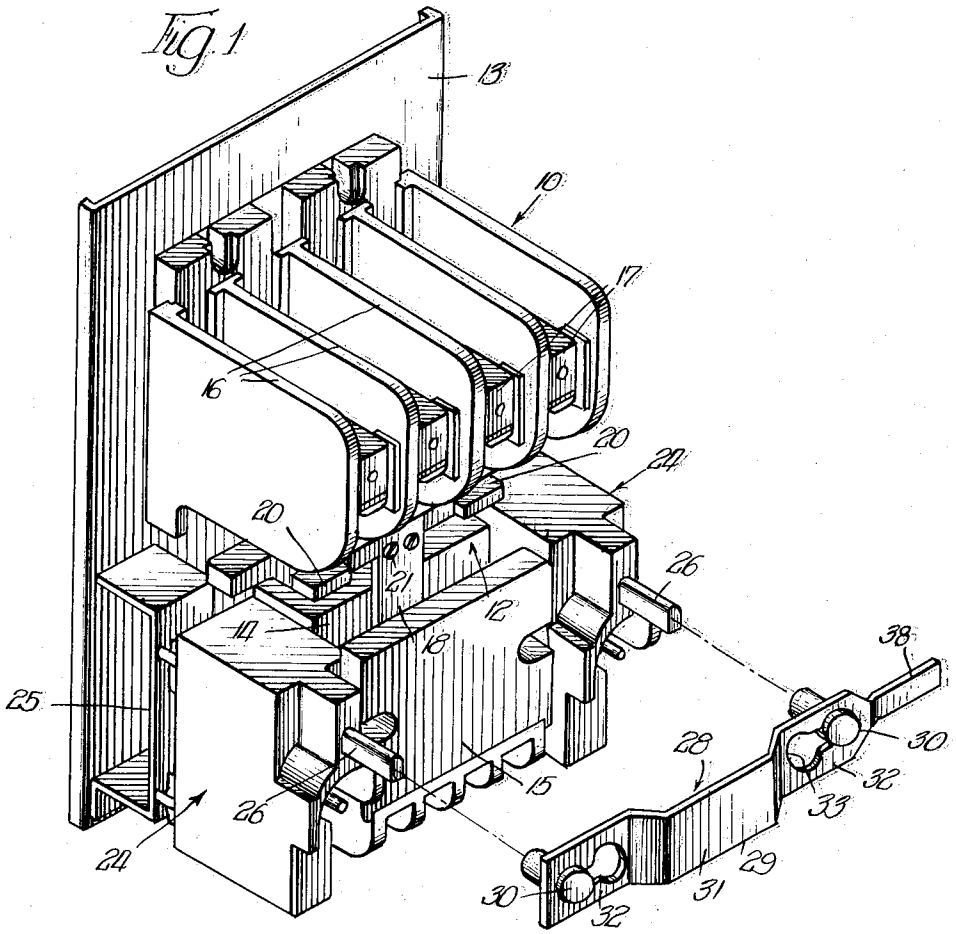


Fig. 2

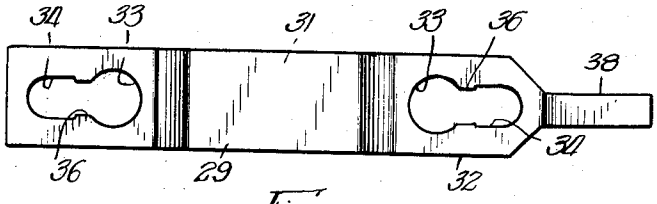


Fig. 4

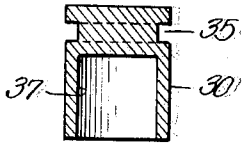
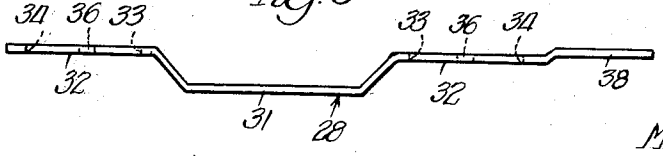


Fig. 3



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CONNECTING DEVICE FOR COUPLING RESET PLUNGERS

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The invention relates to thermal overload relays of the type having manually operable reset plungers and has reference, more particularly, to a novel and improved connecting device for operatively coupling the spaced reset plungers or other resetting mechanism such as may be associated with magnetic starters and similar electrical equipment.

Magnetic switch assemblies for controlling electric motors and the like are generally provided with thermal overload relays having resetting plungers and which, following an overload separation of the switch contacts, must be depressed for resetting the contacts to again close the circuit. Accordingly, the main objective of the present invention is to provide a releasable connecting device for operatively joining the reset plungers of electrical equipment such as combination switch and overload assemblies, whereby the attendant can effect simultaneous actuation of all of the reset plungers with one actuation of the device.

Another object is to provide a connecting member for coupling all of the reset plungers together and which will incorporate plastic attaching cups each adapted to have releasable securement to the plunger and to the connecting member, respectively, and wherein sufficient lateral movement as regards the cups is also provided for, to prevent binding of the resetting plungers in the event they are not in exact alignment.

A further and more specific object of the invention is to provide a new and novel connecting member with attaching cups therefor such as described and wherein the releasable securement of each cup to the connecting member is effected by a bayonet slot arrangement of an improved type.

A still further object of the invention is to provide a bayonet slot arrangement as described for joining each attaching cup to the connecting member and which will incorporate means for permitting freedom of movement of each plastic cup in a lateral direction within its bayonet slot so as to prevent binding of the resetting plungers or other mechanism to which the device may be attached.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

FIGURE 1 is a perspective view of a magnetic switch assemblage having a pair of overload relays with resetting plungers to which the connecting device of the invention may be attached;

FIGURE 2 is a front elevational view of the present connecting member, the same showing the improved bayonet slot opening;

FIGURE 3 is a top plan view of the connecting member shown in FIGURE 2; and

FIGURE 4 is a longitudinal sectional view taken through one of the plastic attaching cups.

Referring to the drawings and in particular to FIGURE 1, the magnetic switch assembly as disclosed has been selected to assist in explaining and understanding the present invention. Said switch assembly essentially includes the

terminal board or contact housing **10** formed of insulating material and the electromagnetic switch structure, generally indicated by the numeral **12**. The terminal board **10** is suitably fastened to the upper section of the support **13**, and the switch structure **12** is likewise suitably mounted on the support having location below the terminal board. The said structure includes, the laminated metal field piece **14**, the plastic encased energizing coil **15** and the laminated metal armature which is mounted for actuation by the field piece but which is not visible in FIGURE 1. For a more complete description of the switch assembly as shown in FIGURE 1 and its mode of operation, reference is made to the patents granted to Furnas 2,844,682 and to White 2,855,548.

The partitions **16** of the insulating terminal board **10** separate and insulate the contact carriers **17**. The said carriers provide the stationary contacts, not shown, of the switch structure, it being understood, however, that the contact carriers and the stationary contacts are suitably included in the electric circuits to be controlled by the switch structure by means of conductors which are connected to the contact carriers. The pusher plate **18** is secured to and actuated by the armature so that the pusher plate has reciprocating movement in a vertical direction. The transverse bar or carriage **20** of insulating material is secured to the pusher plate at the upper end of the plate by means of the screws **21**. Said transverse bar **20** carries the movable contacts of the switch structure and as the pusher plate and bar are caused to reciprocate, the movable contacts engage and disengage the stationary contacts to make and break the electrical circuits, thereby controlling the same in the manner as desired by the operator.

Magnetizing of the laminated field piece **14**, for effecting actuation of the pusher plate **18** and transverse bar **20** as described, is caused by an energization of the coil **15**. The windings of this coil are completely imbedded and hermetically sealed as by molding within a durable plastic enclosure and which is vibration resistant, impervious to dirt, acids and the like. In addition, the plastic encased coil also provides a smooth and wear resistant bearing surface for the armature and pusher plate.

The thermal overload relays **24** are mounted on the support **13** by the brackets **25**. The relays are of the type forming the subject matter of the Cobb Patent 2,597,068. The respective relays are interposed in the electric circuits being controlled by the switch and the same are thus in series circuit relation with the coil **15**. Also, the relays are conveniently located on respective sides of the switch structure. In the event an overload current should develop in the electric circuits being controlled, the relays will effect actuation of cooperating contacts to immediately open the circuits. When the cause producing the overload has been corrected and it is desired to close the circuits, the same can be accomplished by depressing the reciprocable reset plungers **26**. Since the plungers are spaced on respective sides of the structure it requires two operations on the part of the operator to reset both overload relays. The invention provides an improved form of connecting member adapted to be releasably attached to the plungers for coupling the same, and as a result it is only necessary to actuate the connecting member to simultaneously actuate both plungers. The connecting member and its mode of operation will now be described in detail.

The connecting device, which is indicated in its entirety by the numeral **28**, essentially includes the elongated member **29** of metal or other suitable material, and the cups **30** which may be formed of any durable plastic. The plastic materials preferred for the cups are sold under the trademark names of nylon and "Teflon," the former being manufactured by the DuPont Company and the latter by

Rohm and Haas, Inc. The said plastic material for the cups should not only be durable but also flexible and should have the additional ability of maintaining fairly accurate dimensions. The member **29** may be bent into the shape as shown in FIGURE 3 and which is further illustrated in FIGURE 1 wherein the bent diagonal sections provide the front apron **31** located centrally and the laterally extending wings **32**. Each wing is provided with a bayonet slot including a circular opening **33** and a longitudinally extending slot **34**. In accordance with the invention the circular opening has a diameter just slightly larger than that of the plastic cups so that a cup can be inserted in each opening. The width of the slots **34** is determined by the depth of the circumferential groove **35** formed in the top end of each cup. Each wall of a slot is received by and is thus located within the groove. In this manner the cups **30** are retained by the member **29**. The slots must be wide enough to allow freedom of movement of the cups in a lateral direction and yet releasably maintain the cups within the slots, respectively. To accomplish this latter purpose each slot has a projection on one or on both walls. In the illustrated embodiment a projection **36** is provided on one wall of each slot so that the passage is thus narrowed sufficiently to hold the cups within the slots. However, the structure will permit the cups to be easily inserted or released by exerting a slight pressure. The cups are also formed with a recess **37** which extends from the end opposite the groove to approximately the center of the cup in the direction of its length. The diameter of the recess is determined by the width of the reset plungers to be coupled by the cups, since the cups must engage the plungers with a tight fit for maintaining the parts in connected relation. However, it is also desired to have the cups releasable from the plungers in the event it becomes necessary to disconnect the parts for repair or replacement. The extension **38** at one end of the connecting member is provided for actuating the resetting plunger of a third overload relay should the same be associated with the present switch structure.

FIGURE 1 illustrates the manner of coupling the connecting device of the invention with a pair of spaced resetting plungers such as **26**. The cups are in place in the lateral slots **34** of member **29** and upon exerting a slight pressure on each cup they can be pressed onto the extending end of the plungers respectively. Binding of the plungers during actuation is effectively prevented by the freedom of movement which the cups have within the lateral slots.

This invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will, of course, be apparent to those skilled in the art without

departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a connecting device of the character described, the combination with spaced overload relays providing reciprocable resetting plungers which are also spaced, of an elongated connecting member for coupling the plungers for simultaneous actuation, a plurality of plastic cup-shaped elements, each element being loosely and releasably carried by the connecting member by means of a bayonet-slot formed in the member and a groove in the plastic cup-shaped element which receives the edges of the slot, and said plastic cup-shaped elements being adapted to have a releasable press-fit with the plungers respectively.

2. In a connecting device of the character described, the combination with a pair of spaced overload relays providing reciprocable resetting plungers which are also spaced, of an elongated connecting member for coupling the plungers for simultaneous actuation, a pair of attaching members in the form of plastic cup-shaped elements each having a circumferential groove and an open-end recess, said member having a pair of bayonet slots formed therein and which receive the cup-shaped elements respectively by means of the circumferential groove, whereby the elements are loosely and reciprocably carried by the connecting member, and each cup-shaped element being adapted to receive a plunger in the open-end recess thereof with a press-fit.

3. In a connecting device for coupling the resetting plungers of overload relays and the like, the combination including an elongated connecting member having a bayonet-slot opening at respective ends of the same, a pair of attaching members in the form of plastic cup-shaped elements each having a circumferential groove and an open-end recess, said plastic cup-shaped elements being carried by the connecting member by having an element in each slot of the bayonet slot opening, whereby the circumferential groove of each element receives the edges of its slot to retain the element in a manner permitting limited movement laterally, and each cup-shaped element being adapted to receive a plunger in the open-end recess thereof with a press-fit.

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