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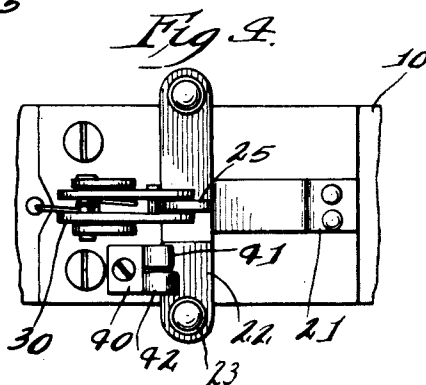
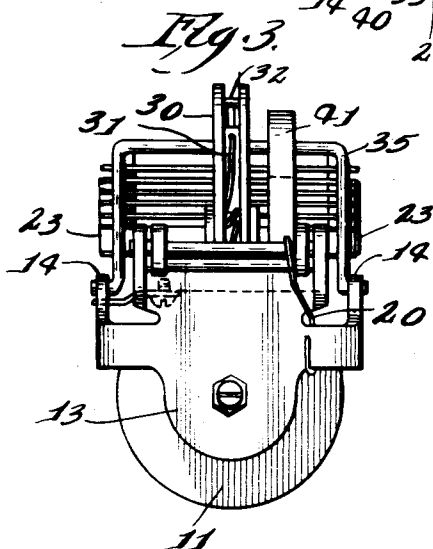
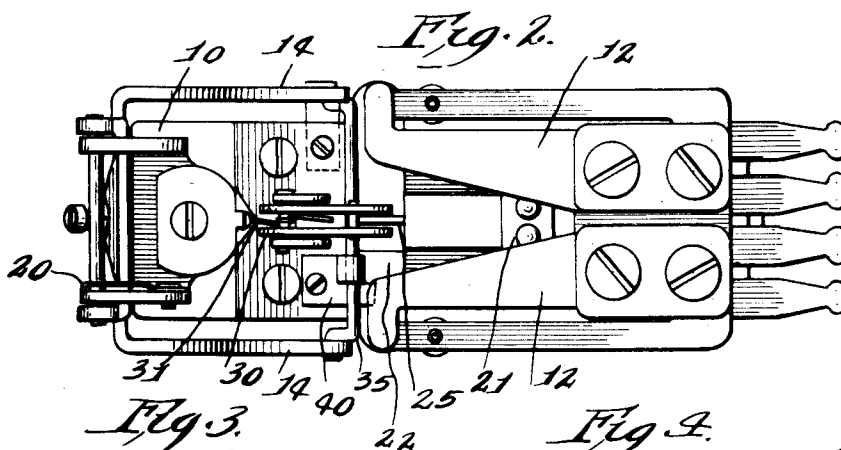
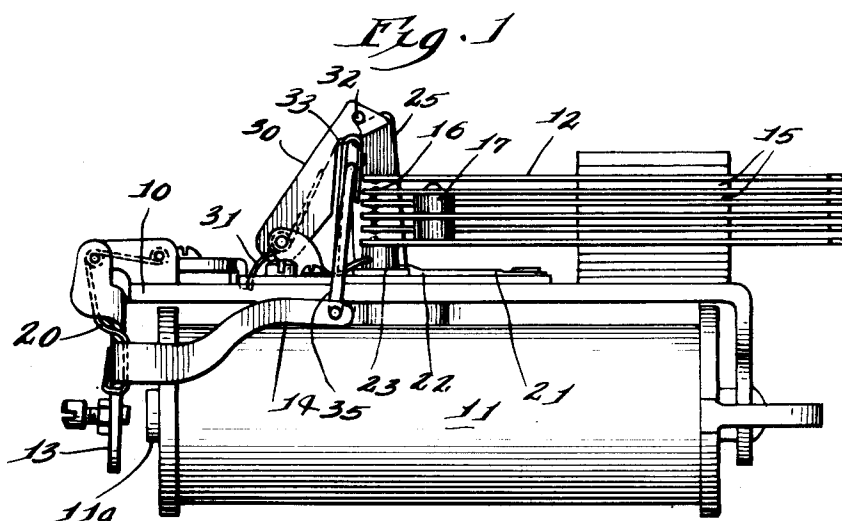
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2,534,797

SWITCH HOLDING AND RELEASE MECHANISM

Filed Oct. 14, 1949

2 Sheets-Sheet 1



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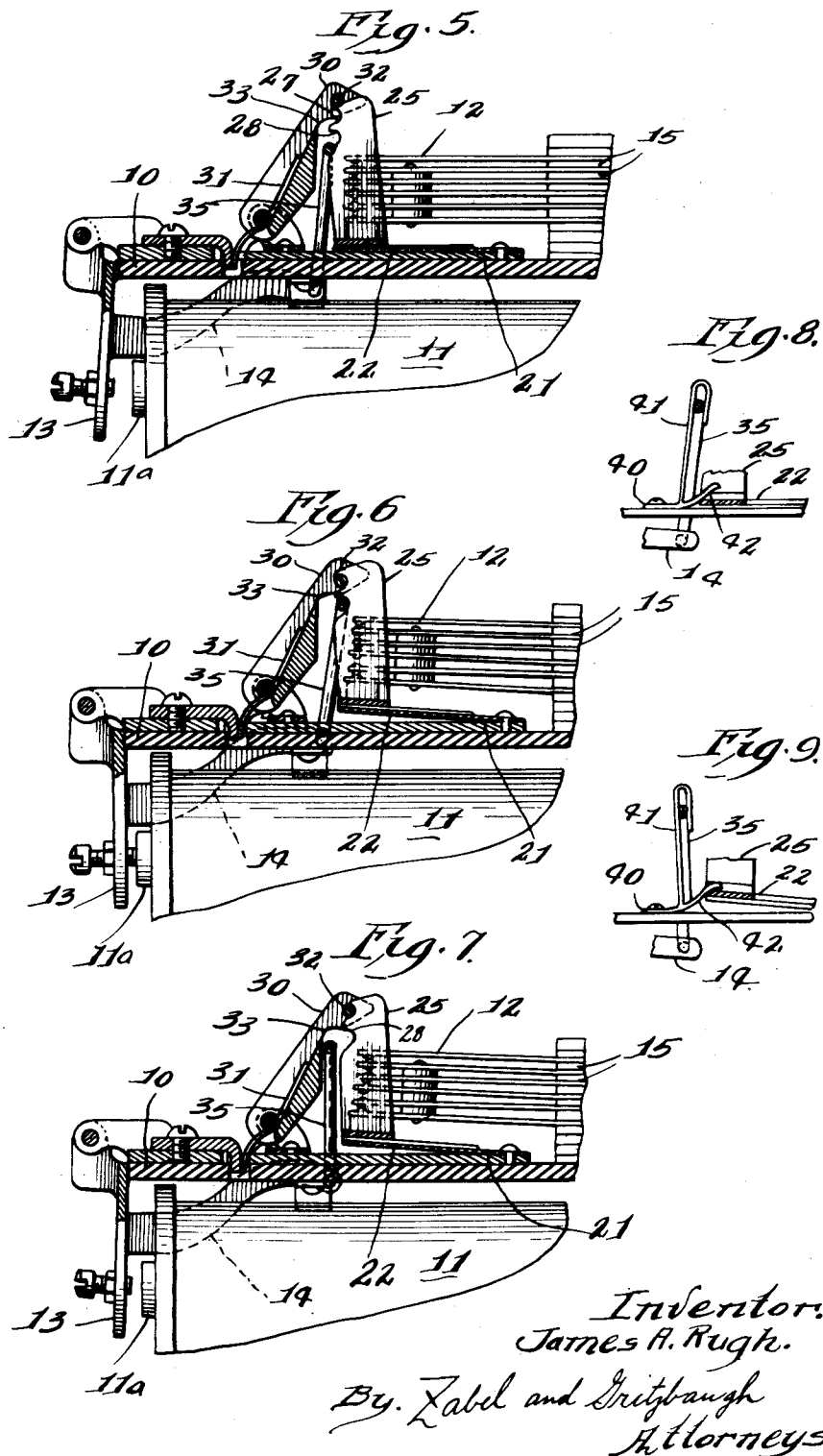
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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SWITCH HOLDING AND RELEASE
MECHANISM

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5 Claims. (Cl. 200—87)

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My invention relates to a switch holding and release mechanism that is particularly designed for use with relay type switches, although it can be used with other type switches.

Switches of the relay type are extensively used in electric and electronic circuits, particularly in the communications field. These switches have a plurality of stacked contact pairs, some of which at any one time are open, while others are closed. The contact pairs are connected to adjacent pairs by insulating spacers, so that a switching force applied to one of the pairs is effective to move all the contact pairs to an alternative switch position. That is, contact pairs that normally are closed, are opened by switch action, while pairs normally open are closed by switch action.

In switches of the aforesaid type, the switching force is produced by an electromagnet (coil) and a cooperating armature. When switch action is desired, the coil is energized, and the armature motion is applied to the contact pairs to reverse their switch positions. However, the coil must be kept energized for as long as it is desired to hold the contacts in such reverse or alternative positions. The contact pairs, since they are spring mounted, restore themselves to the original positions when the coil is deenergized.

One object of my invention is to provide a mechanical holding and release mechanism for a relay type switch of this general character. With my mechanism, switch action is produced when merely a short electrical impulse is applied to the coil. The resultant armature action is transmitted to the contact pairs to alter their positions, at which time the mechanism of my invention functions to mechanically hold the contacts in their alternative positions. The armature returns to its original position at the end of the applied electrical impulse. The holding mechanism continues to hold the contact pairs in the alternative positions indefinitely, or until such time as a next successive impulse is applied to the coil. Upon such energization of the coil, armature action functions to release the holding mechanism to permit the contact pairs to return to their original positions.

Another object is to provide a switch holding and release mechanism having an actuator that moves alternatively along two different paths. These paths are determined by a guide means that is responsive to the position of the switch contacts. If the contacts are in one position, the actuator moves along one path, while if the contacts are in their alternative position, the

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actuator moves along the other path. In this way the contact pairs are successively opened and closed.

Other objects and advantages of my invention will be apparent as the description proceeds, reference being had to the accompanying drawings wherein one form of the invention is shown. It is to be understood that the description and drawings are illustrative only, and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings:

Fig. 1 is a side elevational view of a relay type switch embodying my holding and release mechanism, the mechanism being shown in original or released condition;

Fig. 2 is a top view of the switch shown in Fig. 1;

Fig. 3 is an end view looking from the left of Fig. 1;

Fig. 4 is a top view showing certain details of my holding and release mechanism;

Fig. 5 is a fragmentary side view, partly in section, showing my holding and release mechanism in released condition;

Fig. 6 is a fragmentary side view, partly in section, showing my mechanism in holding condition, the armature being shown as engaging the coil core;

Fig. 7 is similar to Fig. 6 except that the armature is shown separated from the coil core, and

Figs. 8 and 9 are views showing the guide means that forms a part of my invention.

Referring to the drawings, the relay type switch for which my invention is particularly designed comprises a frame 10, a coil 11, core 11a, stacked switch contacts 12 and a hinged armature 13. The armature has a pair of arms 14 that terminate adjacent the lowermost switch contacts 12.

Switch contacts 12 are elongated spring strips that are stacked one above the other in two stacks, adjacent strips being held in separated relationship by insulators 15. The free ends of the strips carry contact points 16, the points being located on the strip tops, bottoms, or both, depending upon the switch characteristics desired. Adjacent strips in each stack constitute a pair of contacts. Insulating spacers 17 connect the corresponding strips of adjacent pairs, and depending upon the size of the spacers, the contacts of each pair are either open or closed.

Referring to Fig. 1, the lowermost contact pair is open, while the next higher one is closed. The

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next is open, the next closed, while the upper one is open. This sequence is merely illustrative since the possible variations are numerous.

The relay type switch so far described is conventional and well known in the art. Accordingly, a more detailed description is deemed unnecessary. The holding and release mechanism of my invention is applied to such a switch. It will now be described.

A spring such as wire spring 20 is provided to bias armature 13 to the position shown in Fig. 1, namely, to the position away from the core 11a of coil 11. After the armature has been attracted to the core in response to momentary coil energization, spring 20 functions to return the armature to its original position.

A resilient member such as a leaf spring 21 is attached to frame 10 between the two contact stacks. Spring 21 carries at its free end a contact engaging member 22. In the structure illustrated, spring 21 forms the portion of the stem of a T, while contact engaging member 22 forms the remaining portion of the stem and the transversely extending head of the T. The ends of the transversely extending head carry insulating elements 23 that engage the lowermost contacts of each stack (Fig. 1).

Contact engaging member 22 carries a vertical bar 25 that extends upwardly between the two stacks of contacts. Bar 25 has upper and lower seats such as are defined by notches 27 and 28, respectively. These notches are best shown in Figs. 5, 6 and 7.

A link 30 is pivoted at one end to frame 10, and it is biased by a spring 31 toward bar 25. Link 30, as illustrated, is a bifurcated element having at its free end a pin 32 that connects the two portions. This pin, sometimes referred to as a projection, is adapted to engage the upper seat or notch 27 of bar 25, as will hereinafter appear. Link 30 also has a seat defined by a notch 33 that faces bar 25. The purpose of notch 33 will hereinafter appear.

A bar and link actuator is connected to the free ends of armature arms 14. In the example shown, this actuator takes the form of a U-shaped element 35 having its ends pivoted to the arms 14. The web of U-shaped element 35 extends between bar 25 and link 30 near the point where the bar and link intersect. The web portion of element 35 alternatively engages the lower seat or notch 28 of bar 25 and the notch 33 of link 30. A guide means for directing such alternate engagement will now be described.

This guide means is shown in detail in Figs. 8 and 9. It also appears in Figs. 1-4. In the form illustrated it comprises a strip 40 of more or less resilient material attached at one end to frame 10. The other end is split into two portions. One portion, labeled 41 (Figs. 3, 4, 8 and 9), is bent upwardly from frame 10. This end is bent back upon itself to form a U which constitutes a guide for the web of U-shaped element 35. The other portion, labeled 42, extends generally parallel to frame 10, and it overlies and engages a portion of contact engaging member 22 as best shown in Figs. 8 and 9. Since contact engaging member 22 is in one position prior to switch action (Fig. 8), and is in another position after switch action (Fig. 9), it will be seen that portion 42 has two positions. The guide defined by portion 41 responds to the position of portion 42 and thus it provides two paths. One path, Fig. 8, is utilized to guide the web of actuator 35 into the lower seat 28 of bar 25, while the other path, Fig.

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9, is used to guide the web into notch 33 of link 30. This action will appear more fully in the following description of switch operation.

Referring to Fig. 1, the switch is shown in original or released position. In other words, contact engaging member 23 is out of effective engagement with the lowermost switch contacts and armature 13 is remote from core 11a. Link 30 is spring biased toward bar 25 with its projection or pin 32 out of engagement with upper seat or notch 27 of the bar.

When coil 11 is momentarily energized, armature 13 is attracted to core 11a. The ends of armature arms 14 swing upwardly and, as actuator 35 is guided to the right of center (Fig. 8), the web of actuator 35 engages lower seat or notch 28 of bar 25. This action causes bar 25 to be raised upwardly carrying with it contact engaging member 22. The latter, through insulating elements 23, engages the lowermost switch contacts and causes all the switch pairs to assume alternative switch positions. When bar 25 reaches its upper limit of travel, the spring bias of link 30 causes projection or pin 32 to seat itself in the upper seat or notch 27 of bar 25. This relationship is stable, and, accordingly, contact engaging member 22 is held in engaging position. Thus, my mechanism indefinitely holds the switch in alternative switch position.

At this time, contact engaging member 22 is in the position shown in Fig. 9, its upper position. Portion 42 of guide 40 is in a correspondingly upper position, thus to establish a left of center path for actuator 35.

When coil 11 is again energized by a momentary impulse, armature action causes actuator 35 to move upwardly, but this time the upward movement is along the left of center path. This path causes the web of actuator 35 to engage seat or notch 33 of link 30, thereby raising the link sufficiently to unseat pin 32 from the upper seat 27 of bar 25. Thereupon leaf spring 21 functions to restore contact engaging member to its original position as shown in Figs. 1, 5, and 8. When this occurs, the various pairs of switch contacts 12 restore themselves to their original positions. The switch is then ready for subsequent switch action as above described.

From the above description it is thought that the construction and advantages of my invention will be readily apparent to those skilled in the art. Various changes and modifications may be made without departing from the spirit or losing the advantages of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a relay type switch comprising a frame, a coil, switch contacts, and a hinged, spring biased armature having a pair of arms terminating adjacent said contacts, the combination therewith of a switch holding and release mechanism including a leaf spring attached to said frame, a contact engaging member on the free end of said spring, a bar having an upper and a lower notch carried by said contact engaging member, a link pivoted to said frame and having a projection at its free end adapted to engage said upper notch, said link being spring biased toward said bar and having a notch facing said bar, a U-shaped element having its ends pivotally mounted to said armature arms with its web adapted alternatively to engage the lower notch of said bar and the link notch, and a guide means for directing such alternative engagement,

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whereby momentary armature action causes said U-shaped member to engage the lower notch of said bar and elevate said bar sufficiently for said contact engaging member to actuate the stacked contacts, the projection of said link entering the upper bar notch to hold said bar in elevated position, and whereby next momentary armature action causes said U-shaped member to engage said link notch to disengage said projection from the upper bar notch and permit said contact engaging member to return to its original position under the influence of said leaf spring.

2. The combination of claim 1 wherein said guide means comprises a resilient strip attached at one end to said frame, the other end being split into two portions, one portion extending upwardly from said frame and forming a guide for the web of said U-shaped member, the other portion extending generally parallel to said frame and overlying said contact engaging member whereby the direction established by the guide is responsive to the position of said contact engaging member.

3. In a relay type switch comprising a frame, a coil, switch contacts, and a hinged, spring biased armature having a pair of arms terminating adjacent said contacts, the combination therewith of a switch holding and release mechanism including a contact engaging member resiliently attached to said frame, a bar having an upper and lower seat means carried by said contact engaging member, a link pivoted to said frame and having a portion at its free end adapted to engage said upper seat means, said link being spring biased toward said bar and having a seat means facing said bar, a U-shaped element having its ends pivotally mounted to said armature arms with its web adapted alternatively to engage the lower seat means of said bar and the seat means of said link, and a guide means for directing such alternative engagement.

4. In a relay type switch comprising a frame, a

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coll, switch contacts, and a hinged, spring biased armature having a pair of arms terminating adjacent said contacts, the combination therewith of a switch holding and release mechanism including a contact engaging member resiliently attached to said frame, a bar having an upper and lower seat means carried by said contact engaging member, a link pivoted to said frame and having a portion at its free end adapted to engage said upper seat means, said link being spring biased toward said bar and having a seat means facing said bar, a bar and link actuator carried by said armature arms and adapted alternately to engage the lower seat means of said bar and the seat means of said link, and a guide means for directing such alternative engagement.

5. In a relay type switch comprising a frame, a coil, switch contacts, and a hinged, spring biased armature having a pair of arms terminating adjacent said contacts, the combination therewith of a switch holding and release mechanism including a contact engaging member resiliently attached to said frame, a bar carried by said contact engaging member, a link pivoted to said frame and spring biased toward said bar, a bar and link actuator carried by said armature arms and adapted alternatively to engage said bar and said link in response to armature action, and a guide means for directing such alternative engagement.

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