

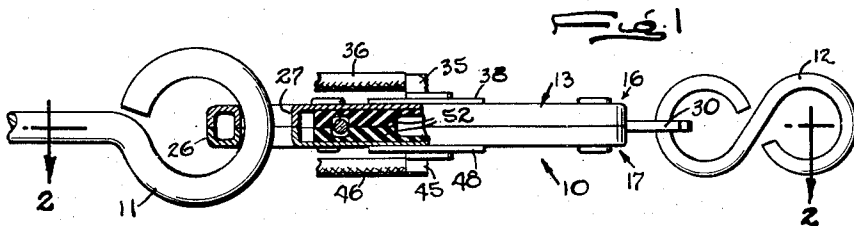
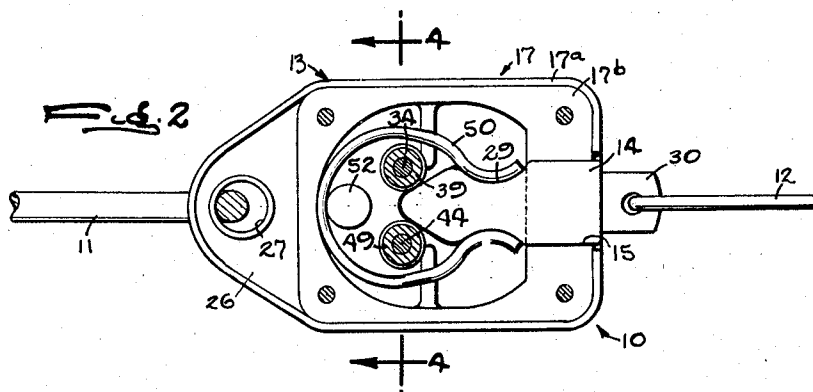
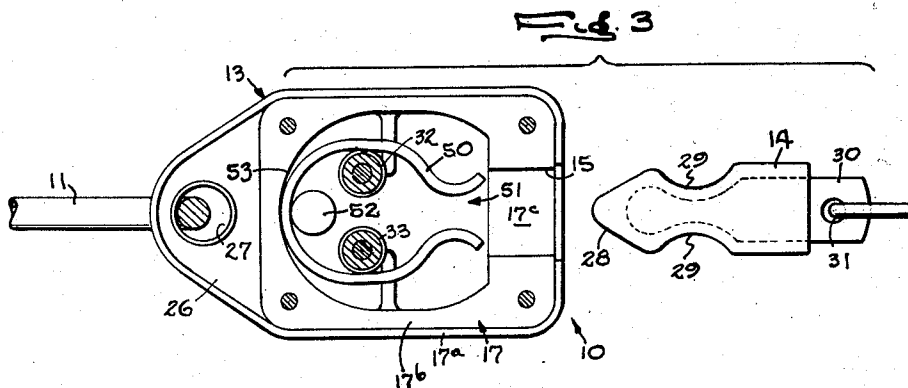
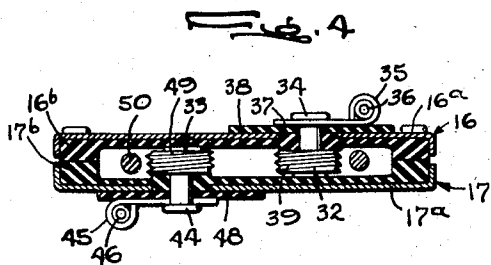
July 22, 1958

V. R. EDGAR

2,844,675

TENSION RESPONSIVE SWITCH

Filed June 28, 1956



INVENTOR
Victor R. Edgar
by Carlson, Stynes, Hubbard & Wolfe
ATTORNEYS

1

2,844,675

TENSION RESPONSIVE SWITCH

Victor R. Edgar, Rockton, Ill., assignor to Warner Electric Brake & Clutch Company, Beloit, Ill., a corporation of Illinois

Application June 28, 1956, Serial No. 594,414

3 Claims. (Cl. 200—61.19)

This invention relates to an electric switch having separable parts adapted to separate under tension and thus actuate the switch. A switch of this character is shown in U. S. Patent No. 2,305,603, issued September 25, 1939. Reference may be made to the patent for a full and complete disclosure of a tractor-trailer safety device wherein a switch of this type has particular utility.

It is an object of the invention to provide a switch that is substantially more simple and economical, and yet more positive and reliable, than the patented construction identified above. It is a related object to provide a tension responsive switch that is light, compact, resistant to rust and corrosion and whose electrical contacts are fully protected from dirt and water.

With more particularity it is an object to provide a tension responsive switch having a novel construction employing a single contact closing ring which also holds the separable portions of the switch together. It is also a more detailed object to provide a tension responsive switch having a separable plug which positively restrains the switch closing contacts in their open positions.

Other objects and advantages of the invention will become apparent upon reading the following detailed discussion and upon reference to the attached drawings in which:

Figure 1 is a side view, partially in section, of a switch constructed according to the invention.

Fig. 2 is a top sectional view of the Fig. 1 switch taken along the line 2—2 in Fig. 1.

Fig. 3 is similar to Fig. 2 but showing the separable switch portions apart and the switch closed.

Fig. 4 is a transverse section view taken along the line 4—4 of Fig. 2.

While the invention will be described in connection with a preferred embodiment, it will be understood that I do not intend to limit the invention to that embodiment but, on the contrary, intend to cover such alternative embodiments and constructions as may be included within the spirit and scope of the appended claims.

Turning now to Figs. 1 and 2, there is shown a switch 10 constructed according to the invention forming a connection between two parts 11, 12 of a linked series of elements designed to be attached between two separable structures, for example, a tractor and trailer, not shown. When the linked elements are tensioned above a certain predetermined amount, for example, by the separation of the separable structures between which they are attached, the switch 10 pulls apart, breaking the linked connection and actuating the switch. Where used in connection with a trailer, the operation of the switch may be used to actuate a brake or other safety device.

The separable portions of the switch 10 comprise a hollow casing 13 and a plug 14 which is insertable through an opening 15 in one end of the casing. The casing is formed of two identical half sections 16 and 17 which are placed in face to face contact and riveted together. The half sections are formed of stamped metal cover pieces 16a, 17a with inturned edges which enclose hollowed out,

2

generally rectangular blocks of insulating material 16b, 17b respectively. Each block is relieved at one end as indicated at 17c with the relieved portions in register to form a rectangular guiding slide at the opening 15 for the plug 14. At the end of the casing opposite from the opening 15 the cover pieces 16a, 17a are formed to define an anchoring extension 26 having a link receiving opening 27.

The plug 14 is of rectangular section and dimensioned to have a smooth sliding fit with the walls of the opening 15. The plug is, moreover, formed with a tapered nose 28 and two outwardly facing notches 29 to which later detailed reference will be made. The plug 14 is composed of an insulating material and has imbedded and anchored within it a metal strip 30. The strip 30 extends from the end of the plug opposite the tapered nose 28 and has a link receiving opening 31 formed in the extension.

Mounted side by side within the hollow portion of casing 13 are two electrical contacts 32, 33. One contact is mounted on each identical section 16, 17 and is equally offset from the longitudinal center line of the switch so that when the sections are assembled, the contacts are spaced symmetrically with respect to the opening 15. With regard to the details of the contact 32 carried by section 16, it comprises an annular ferrule 39, having a sharply ridged or serrated outer surface which may be in the form of a turned thread, held in place by an electrically conductive rivet 34 which extends through an opening 37 and which terminates in a soldering lug, crimp type connector 35 or the like, engaging a lead wire 36. For the purpose of insulating the rivet and connector, the block of insulating material 20 is formed with an integral insulating boss which extends through the metal piece 16a and which cooperates with an insulating washer 38, which overlies the piece 16a. The mounting of contact 33 is identical to that of contact 32, the same reference numerals plus 10 being applied.

In accordance with the present invention a single resilient contact closing ring 50 is mounted within the casing 13 to releasably hold the separable parts of the switch together under open circuit conditions and to positively bridge the gap between the contacts, i. e., close the switch, when the switch parts are separated. The ring 50 is generally C-shaped, with its ends turned outwardly to define a throat 51 and is positioned within the casing 13 to surround the contacts 32 and 33 with the throat 51 aligned with opening 15. The ring is anchored at its midpoint on a line extending between the contacts 32 and 33 by means of an upstanding post 52 formed in each block 20 making up the two halves of the casing. The posts 52 are closely spaced from the inner walls of the blocks, and the ring 50 is locked in place between the walls and the stubs when the switch is assembled.

The ring 50 is formed of resilient conductive material, for example Phosphor bronze, and is pre-stressed so as to contract or squeeze inwardly into engagement with the contacts 32 and 33. The serrations on the ferrules 39, 49 tend to bite into the ring 50 when it closes on the contacts, thus insuring a good electrical contact and permitting the electrical current to flow through the ring from contact to contact. If desired, the ring 50, which is symmetrically hooked on the posts 52, may be provided with a limited amount of clearance behind it as indicated at 53 to permit the ring to rock in its place through a small angle, thus to insure the contact pressures applied against the contacts 32, 33 are equalized while, nevertheless, keeping the ring substantially centered for reception of the plug 14.

Further in accordance with the invention the plug 14 is so formed as to have a detenting engagement with the ends of the ring 50 to hold the plug in its inserted position incident to maintaining the open circuit condition.

More specifically, it can be seen that as the plug 14 is slid into opening 15, the tapered nose 28 enters the ring throat 51 and wedges the ends of the ring apart to expand ring 50 out of engagement with the contacts 32 and 33 and open the switch. When the plug is fully inserted, the nose 28 centers itself in wedged engagement between the two contacts, and the turned ends of the ring, forming throat 51, snap into the lateral notches 29 on the plug. The resilient engagement of ring throat 51 with the plug notches 29 releasably secures the plug 14 in its fully inserted position, requiring the application of a predetermined force for withdrawal. It is to be especially noted that when the plug is fully inserted and releasably secured in place, it is impossible for any relative movement of the plug to occur, either twisting or lateral, since its nose 28 is supported between the contacts 32 and 33 and since its other end is supported by the walls of the opening 15. This insures that the contact with ring 50 is broken and remains broken at both of the contacts 32, 33.

It can thus be seen that when the plug 14 is inserted into the casing it will snap into place and be releasably held, and the inserted plug positively blocks the switch against closure. The positive maintenance of the open circuit condition, even in the face of the most severe shock, vibration, or direct blow is of importance when the device is used for automatic control of a brake or other drastic safety device, the inadvertent operation of which could cause a hazard under normal operating conditions. In use the assembled switch 10 is incorporated into a serial linked connection, generally a connection which is auxiliary to the main draft connection. Normally the switch is not called upon to resist any axial loading. However, when a loading is imposed greater than the detenting force, separation occurs immediately, and contact is immediately and positively made. The sharp contact edges on the ferrules 39, 49 insure a low resistance connection even after years in the open circuit condition.

When the plug 14 is in place the electrical components of the switch are completely enclosed within the casing 13 and are thus protected from water, dust and dirt. The switch is therefore trouble-free, and when once installed can be depended upon to properly function without further attention.

I claim as my invention:

1. A tension responsive switch comprising a hollow casing having an opening, spaced insulated contacts within said casing secured to a wall thereof and disposed on opposite sides of the axis of said opening, a resilient split ring of C-shape encircling said contacts within said casing and stressed to contract into engagement therewith when free, means on said casing supporting said ring in-

intermediate its ends with the ends of the ring on either side of said axis and between said contacts and said opening, an insulating plug having an end insertable through said opening along said axis and between said ring ends to separate the latter and expand the ring out of engagement with said contacts, said plug having notches opening laterally therefrom for receiving said ring ends when the plug end is in abutment with the adjacent sides of said contacts.

2. A tension responsive switch comprising a hollow casing having an opening, spaced insulated contacts within said casing secured to a wall thereof and disposed on opposite sides of the axis of said opening, a resilient split ring of C-shape disposed substantially in the plane of said axis and encircling said contacts within said casing, said ring being stressed to contract into engagement therewith when free, said ring having its ends flared outwardly to form a throat, insulated means on said casing anchoring said ring intermediate its ends with said throat aligned with and facing said opening, an insulating plug having a tapered end and insertable along said axis through said opening and into said throat to separate the ring ends and expand the ring out of engagement with said contacts, said plug having depressions opening laterally therefrom for receiving said flared ring ends when the tapered plug end is wedged between the adjacent sides of said contacts.

3. A tension responsive switch comprising a hollow casing having an opening, spaced insulated contacts within said casing secured to a wall thereof and disposed on opposite sides of the axis of said opening, a resilient split ring of C-shape disposed substantially in a plane including said axis and encircling said contacts within said casing, said ring being stressed to contract into engagement with said contacts when free, means on said casing supporting said ring intermediate its ends with the free ends of the ring disposed on either side of said axis and spaced along the axis between said contacts and said opening, an insulating plug having an end insertable through said opening along said axis to enter between said ring ends and separate the latter and expand the ring out of engagement with said contacts, said plug having notches opening laterally therefrom for receiving said ring ends after the plug has separated these ends and expanded said ring out of engagement with said contacts.

References Cited in the file of this patent

UNITED STATES PATENTS

503,867	Matson	Aug. 22, 1893
504,980	Hall et al.	Sept. 12, 1893
2,305,603	Cadman	Dec. 22, 1942