March 23, 1937. T. F. JOHNSON 2,074,913

DROP-OUT FUSE

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Fig. 1

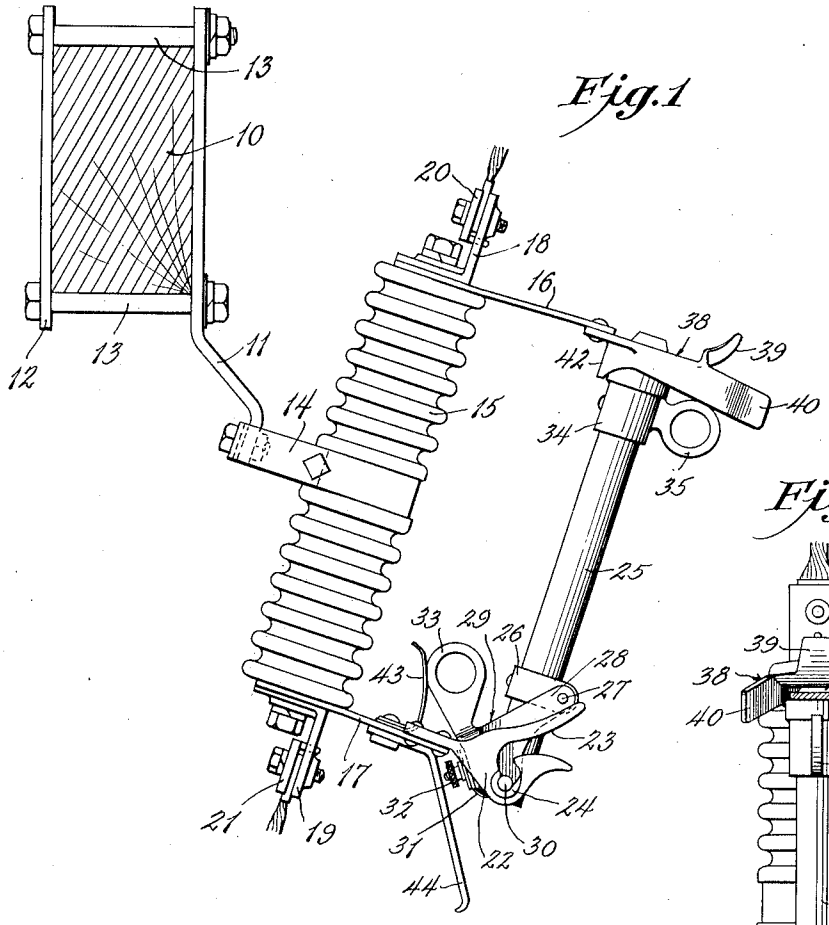


Fig. 2

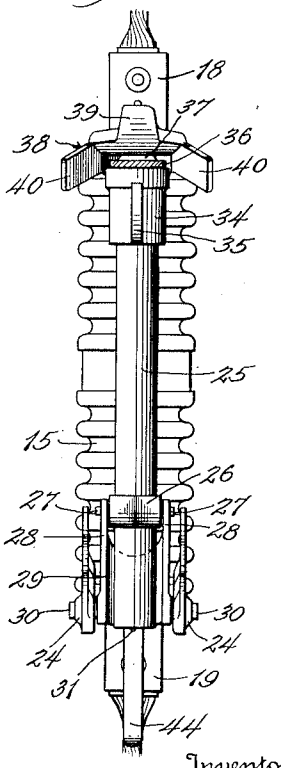
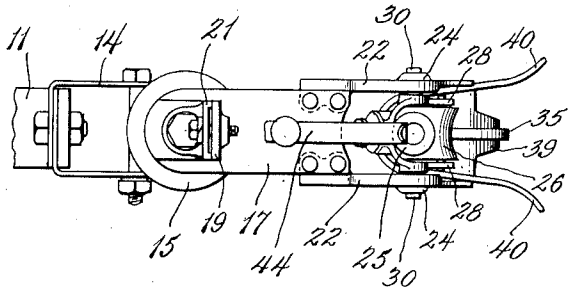


Fig. 3



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Fig. 4

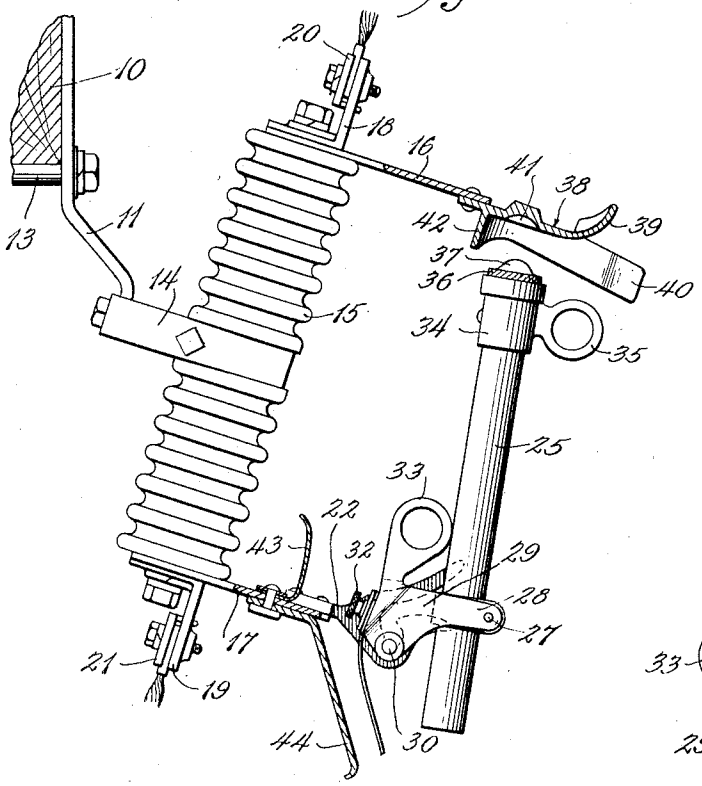


Fig. 6

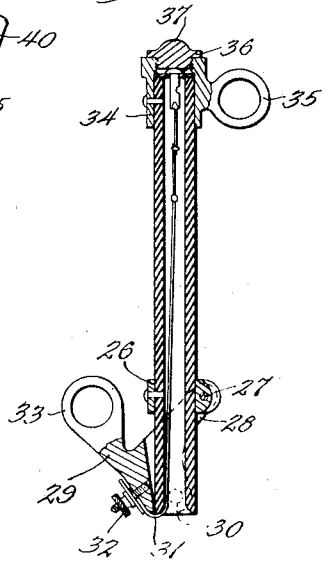


Fig. 5

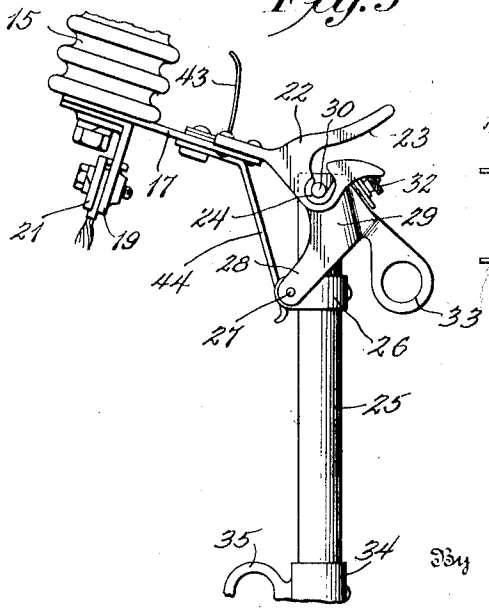
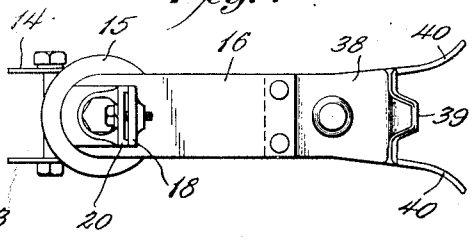


Fig. 7



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DROP-OUT FUSE

Tomlinson Fort Johnson, Atlanta, Ga.

Application May 6, 1935, Serial No. 20,106

9 Claims. (Cl. 200—116)

This invention relates to drop out fuses for high tension transmission lines and, among other objects, aims to provide an improved and greatly simplified fuse of the switch type wherein the fuse holder is mounted between terminals on spring arms which are secured to a single insulator adapted to be supported by a bracket on a cross arm or other supporting structure and in which the fuse, when blown, is adapted initially to be forced out by spring pressure and then fall by gravity, so that the fuse holder may easily be removed for refusing. The main idea is to provide a very simple, relatively cheap, rugged and reliable fuse of this type especially adapted to be secured to cross arms on pole type transmission lines.

Other aims and advantages of the invention will appear in the specification, when considered in connection with the illustrative embodiment thereof shown in the accompanying drawings, wherein:

Fig. 1 is a side elevation of a drop out fuse assembly embodying the invention;

Fig. 2 is a front elevation of the fuse assembly shown in Fig. 1;

Fig. 3 is a bottom plan view;

Fig. 4 is a sectional view, parts being shown in side elevation and in a different position from that shown in Fig. 1;

Fig. 5 is a fragmentary side elevation showing the fuse unit in its drop out position;

Fig. 6 is a longitudinal sectional view of the fuse unit; and

Fig. 7 is a top plan view of the fuse assembly shown in Fig. 1.

Referring particularly to the drawings, the drop out fuse assembly is shown as being applied to a cross arm 10 of an ordinary pole type transmission line, although it is to be understood that it may be mounted on any supporting structure. In this instance, it is supported by a strap metal bracket 11 depending from the cross arm and having a clamping plate 12 for securing it on one side of the cross arm by means of bolts 13. The bracket 11 is slightly resilient and is here shown as being bolted at its lower end to a clamp 14 on a single bushing type insulator 15. This clamp is preferably secured in the middle of the insulator and the insulator is supported at an acute angle to the vertical, the bracket 11 being suitably bent for that purpose. Herein, the insulator is shown as having spring arms 16 and 17 in the form of phosphor-bronze plates extending outwardly and laterally from the upper and lower ends. Also, terminal lugs 18 and 19 are bolted against the inner ends of the arms and have line clamps 20 and 21 respectively. These terminal lugs are shown as being in the form of L-shaped castings firmly to secure the inner ends of the spring arms or brackets to the ends of the insulator.

In the present example, the fuse holder is carried by the outer ends of the spring arms 16 and 17 and is arranged to drop out initially and then swing downwardly. For this purpose, the lower bracket is shown as having a pair of spaced hinge elements or ears 22 secured thereto preferably by rivets, as shown in Fig. 3, each ear having a trunnion guiding slot 23 and an offset trunnion bearing 24 at the bottom. The switch fuse unit is shown as consisting of an ordinary insulating fuse tube 25, preferably made of "bakelite," and having a clamping collar 26 secured near its lower end. The clamping collar 26 has trunnions 27 providing a pivotal connection for arms 28 on a cast metal link or toggle like member 29 so shaped at its lower end as to embrace a portion of the fuse tube and presenting trunnions 30 journaled in the bearings 24. The fuse tube carries an ordinary removable fuse element 31, the free end of which is adapted to be secured under slight tension beneath a clamping nut 32 on the rear face of the link member 29 at its lower end. Also, the link member 29 carries a hook eye 33 on its rear face extending upwardly at an angle and adapted to limit the swinging movement of the tube in the link member. The upper end of the fuse tube carries an ordinary metal ferrule 34 having a hook eye 35 on its front portion adapted to be engaged by an ordinary switch hook to swing the fuse unit to its closed position. The upper end of the ferrule is closed by a removable screw cap 36 adapted to engage the upper terminal of the fuse element. This cap is shown as having a dome shaped upper end 37 cooperating with a single cast metal contact member 38 shown as being riveted to the outer end of the upper spring arm 16. This contact member presents an outwardly flared upper portion having an upwardly curved guiding flange 39 and integral vertical guiding flanges 40 which, incidentally, may serve as arcing horns. The lower face of the contact member is shown as having a depression 41 adapted to receive the dome shaped end 37 of the screw cap 36 and the shape of the guiding flanges 40 is such as to guide the dome properly into its seat. The guiding flanges 40 are connected at their rear end portions by an integral curved portion 42 which

serves as a limiting stop for the fuse unit when it is swung to its closed position. Also, the flange members and the upper portions of the contact member serve as a rain shield or sleet guard and junction protector.

The two spring arms 16 and 17 are normally biased to exert spring pressure on the fuse unit when it is in closed position, as clearly shown in Fig. 1. It will be observed that the link member 29 is held in its stiff-leg position by the fuse element 31. The spring pressure exerted by the two arms 16 and 17 is transmitted to the fuse element through the offset hinge connecting the link arms 28 with the collar 26. This tension is sufficient to separate and expel the fuse element rapidly when it blows out. Incidentally, the upper face of the lower spring arm 17 is shown as having a bent leaf spring contact element 43 which engages the eye 33 when the switch is closed and not only serves as an additional contact element but also exerts some additional spring pressure on the link member 29. When the fuse blows, the link swings about its trunnions to the position shown in Fig. 4. The spring pressure exerted on the fuse unit accelerates this swinging movement. When the fuse tube is in this position, it will be observed that the inner edge of the eye 33 strikes the tube and that the tube is given a further impulse to swing on the trunnions 27. The fuse tube is now overbalanced and will swing rapidly to the position shown in Fig. 5 about both pairs of trunnions 27 and 30 in which position the inner curved face of the collar 26 strikes a shock absorbing spring 44. When the fuse unit is in this position, it is adpated to be lifted out by an ordinary switch hook engaging the eye 33 so that the fuse element can be replaced or a properly fused unit inserted in its stead. The circuit is again closed by means of a switch hook engaging the eye 35, the parts being again placed under tension as described.

From the foregoing description, it will be seen that the drop out fuse is very simple and rugged in its design. It can be manufactured and sold at a relatively low cost. The single supporting insulator is not subjected to excessive breaking shocks because of the spring arms and the spring bracket supporting it. It is easy to operate and can be used as standard equipment on transmission lines.

Obviously, the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly, since they may be employed in various combinations and sub-combinations.

What is claimed is:

1. A drop out fuse of the character described comprising, in combination, an insulator; a support secured to the insulator intermediate its ends; approximately parallel, flat spring arms rigidly secured to the opposite ends of the insulator; contact and hinge members secured to the respective spring arms; a fuse unit pivotally mounted on one of said members and adapted to force both of said spring arms apart when it is swung to circuit closing position; a pivoted link member on the hinged end of said fuse unit; and a fuse element secured at its end to said link member and maintained under tension by the spring pressure of said arms; said link member being free to swing when the fuse element blows initially to release the fuse unit and the entire unit being then free to swing to its open position.

2. A drop out fuse of the character described comprising, in combination, an elongated insulator; a resilient supporting bracket secured to the insulator substantially midway between its ends; a pair of flat spring arms rigidly secured to the opposite ends of the insulator; hinge members on one of said spring arms; a combined sleet hood and contact member on the other spring arm; a fuse unit hinged on said hinged members and adapted to force said spring arms apart when it is swung to circuit closing position; a link member on the hinged end of said fuse unit; and a fuse element secured at its end to said link member and maintained under tension by the spring pressure of said arms; said link member being free to swing when the fuse element blows initially to release the fuse unit and the entire unit being then free to swing to its open position.

3. In a switch type drop out fuse of the character described, an insulator; flat spring arms on the insulator; a fuse unit hingedly and removably supported by one of said spring arms; a hinged link member associated with the fuse unit; a combined sleet hood and contact member on the other spring arm; and a fuse element secured to the link member to hold the unit in circuit closing position with the element under spring tension exerted by said arms, said link member serving initially to release the fuse unit and then to permit it to swing to its open position.

4. A switch type fuse comprising, in combination, an insulating support; a pair of substantially parallel, flat spring arms mounted on said support; slotted hinge members on one of said arms; a combined contact and shield member on the other arm; a fuse unit having a trunnioned link member journaled in said slotted hinge members; a fuse element secured near its free end to the link member to hold it in its stiff leg position, said spring arms imparting opening pressure on the link member when the fuse unit is in circuit closing position; and a supplemental spring acting on the link member to insure quick circuit breaking movement of the fuse unit.

5. In a drop out fuse of the class described, a pair of spaced flat spring arms; slotted bearing members on one arm; a flanged contact member having a rounded socket on the other arm and providing a sleet hood; a fuse unit hinged in said bearing members and having a ball-shaped terminal to snap into said socket in the contact member; and hinged members on the fuse unit connected to place the fuse element under tension when the fuse unit is in its circuit closing position and permitting the fuse unit to swing to its open position when the fuse is blown.

6. In a drop out fuse of the class described, an insulator; a pair of spaced and parallel, flat, spring arms supported on opposite ends of the insulator; bearing brackets on one arm; a flanged contact member on the other arm providing a combined sleet hood and guide; a fuse unit hinged in said bearing brackets; a link member pivotally mounted on the lower end portion of the fuse unit; a fuse element having its free end secured to the link member to hold it in its stiff leg position with the fuse element under tension when the fuse unit is in its circuit closing position; and a spring bumper for the fuse unit when it swings to its open position.

7. In a drop out fuse of the class described, a single elongated insulator; a resilient bracket connected to the insulator; spring arms secured to the opposite ends of the insulator; a pair of slotted bearing brackets secured to one of said

spring arms; a flanged contact member on the other arm providing a sleet hood; a fuse tube having a collar and a trunnioned link member at one end hinged in said bearing brackets; a fuse element in said fuse tube connected to said link member and adapted to hold it in its stiff leg position; a dome shaped plug at the opposite end of the fuse tube; and said contact member having a recess to receive said dome shaped plug when the fuse unit is in its circuit closing position to provide a ball and socket engagement, said spring arms and said link member being arranged to exert tension on said fuse element and to cause said fuse unit initially to drop out when the fuse blows.

8. In a drop out fuse of the class described, an elongated substantially upright insulator; means supporting the insulator intermediate its ends; lateral, approximately parallel flat, spring arms rigidly connected to the opposite ends of the insulator; hinge means on the lower arm; a contact member on the upper arm; a fuse unit removably and hingedly mounted at its lower end in said hinge member and having ball and socket contact at its upper end with said contact member, said fuse unit being inclined at an angle to the vertical to swing outwardly; and supplemental spring means to cause the fuse unit initially to drop out of contact with the contact member when the fuse blows so that it may swing to its fully open position.

9. In a fuse assembly of the character described, an elongated insulator; a hinge member on one end of the insulator; a fuse unit pivotally mounted on said hinge member; a spring arm rigidly secured at one end to the opposite end of the insulator; a combined sleet hood and contact member mounted on said spring arm; a terminal seat in said contact member; and a terminal on the fuse unit having surface engagement with said seat.

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