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PROTECTIVE APPARATUS FOR HIGH TENSION TRANSMISSION LINES

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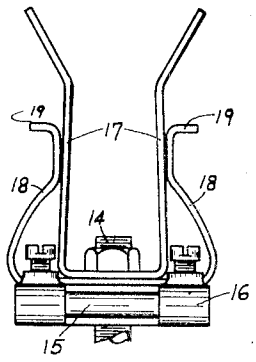


FIG. 2

FIG. 1

FIG. 3.

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PROTECTIVE APPARATUS FOR HIGH TENSION TRANSMISSION LINES

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12 Claims. (Cl. 200—120)

This invention relates to protective apparatus for high tension transmission lines, and deals more particularly with a novel combination line switch and choke coil.

An object of this invention is to provide a combination safety device of the type mentioned, which may be manufactured and sold as an assembled unit, embodying certain novel features of construction which reduce the cost of manufacture and provide a unified structure which is particularly well adapted to the requirements of line switches and fusing apparatus.

A further object is to provide an electrical unit of the type mentioned, which may be manufactured and sold as an assembled unit, the major elements and fastening means therefor being so designed that certain of the elements are adaptable selectively for use in assembling units of different sizes and capacities, and thereby reducing the number of different items of manufacturing and repair stock.

The invention accordingly comprises the elements and combinations of elements, features of construction and arrangements of parts which will be exemplified in the structure hereinafter described, and pointed out in the claims hereinafter appearing.

In the drawing, Fig. 1 is a side elevation showing a preferred embodiment of my device, Fig. 2 is a front elevation of the switch contact structure, and Fig. 3 is an elevation in perspective of one type of slotted member employed as a support for one of the switch contacts.

Referring now to the drawing by reference numerals, 1 designates a cross-arm of the usual construction. Surrounding the cross-arm in gripping relation therewith is a hanger bracket constituting the subject matter of my copending application, Serial No. 487,890, filed October 10, 1930. This hanger bracket is of two-piece construction comprising complementary angulate straps 2 and 3, having portions which conform to the section of the cross-arm. The straps, by preference, are mutually separable, they being connected at their ends by suitable means such as bolts 4, of sufficient length to allow the clamp to embrace any one of the various standard sizes of cross-arms. The strap 3 has a U-shaped band indicated at 5, to which is secured a collar 6, embracing an insulator 7, both being circular in the present example. This collar is centrally disposed upon the insulator, which is preferably of one-piece cylindrical, porcelain construction, the insulator forming a base for the switch assembly and choke coil. The insulator, by preference, is hollow and closed at one end, (the upper end, when mounted as shown) to exclude dirt and moisture, and is provided with the usual drip discharging petticoats 8. Near opposite ends of the insulator are bands 9, which by preference, are of a construction similar to that of the central band or collar 6. The end portions 10, of each band, are adapted to be drawn together by means of threaded elements as shown, whereupon the bands frictionally and securely grip the insulator. The threaded holding elements in the present embodiment are preferably carriage bolts, the squared shank portions of which are disposed in correspondingly shaped apertures, which prevent the bolts from turning when nuts are being threaded thereon. It will be noted that the bands 9 are provided with U-shaped extensions, to accommodate the brackets 12, and the bolts employed in attaching these brackets to the extensions, the arrangement being such that the bolts and brackets are spaced from the insulator body.

It will appear that the brackets 12 collectively serve to support a switch contact assembly, to be hereinafter described. Slotted apertures in arms 13, of the brackets 12 accommodate bolts 14, for securing the contact assemblies, the slotted apertures and bolts permitting the contacts to be adjusted lengthwise of the insulator, whereby the supporting structure is adapted for different lengths of switch blade, or fuse cartridge, and permits an adjusted spacing of the switch terminals to accommodate a variety of sizes of fuse cartridges.

The contact assemblies disposed adjacent the ends of the cartridge member, hereinafter designated, are, by preference, substantially identical in construction and may be mutually interchanged. It may be observed at this point that relatively few different parts are required in the construction of my switch, a feature which greatly reduces the cost of manufacture.

The contact assemblies (Fig. 2), each comprises a metal terminal block 15 having screw clamp connectors 16 for engaging the line or an end of the choke coil. Disposed upon the block 15, one within the other, are a pair of U-shaped clips formed preferably of strip material such as copper. The bolt 14 passes through apertures in the cross portions of the clips and through the slotted aperture in the bracket 12, and fastens these members together. The inner clip has contact arms 17 for engaging opposite sides of the corresponding cartridge contact, and serves to conduct the current thereto. Reinforcing arms 18 of the outer clip are adapted to bear against the contact arms

17 and provide the necessary inward pressure to insure proper engagement with the cartridge contacts. The ends of the arms 18 are turned perpendicularly outward, as shown, forming in the present example keepers designated at 19, for a latch mechanism disposed on the cartridge, and hereinafter described.

The fuse cartridge, (of expulsion type in the present example) constitutes a switch arm for making and breaking the circuit across the switch terminals. The cartridge comprises an elongated inner tube 20 of suitable insulating material which carries metal contact members 21 and 22 adapted to be engaged by the clip arms 17. The tube 20 extends through and a short distance beyond the cartridge terminal 21, hereinafter designated as the hinged terminal. This terminal is provided with an exterior binding post 23 for securing one end of a fuse element 24. The fuse extends along the outside of the tube to the end thereof, where it makes a reverse bend, passes longitudinally through the tube, and terminates at an interior binding post (not shown) on the contact member 22. Access to this post is obtained by removing a threaded cap 25, which closes the end of the cartridge. An outer insulating tube 26, preferably of porcelain, concentrically surrounds the tube 20, and extends between the cartridge terminals 21 and 22, the tube 26 being of sufficient inner diameter to form an air circulating passage between the tubes.

As a means for preventing the cartridge from being blown or jarred out of the terminal assembly, an event liable to occur by reason of a severe fuse explosion under a heavy short circuit, I provide a locking device, mentioned above, which maintains the switch in closed position against any force except that which is definitely intended to open the switch. The latching device consists of a latch member 27, pivotally mounted on the terminal 22, and having paired arms which terminate in hooks 28. The latch member is disposed so that the arms straddle the cartridge, positioning the hooks 28 for engaging the keepers 19 (Fig. 2) when the switch is closed. A resilient member 29 bears against the latch member and tends to urge the hooks in latching position relative to the keepers. For releasing the latch mechanism and operating the switch, I provide a manipulating ring 30 pivotally mounted on the terminal 22 preferably by the same pivot which supports the latch member 27.

The latch and manipulating members are free to pivotally move, independently of each other. Thus the pressure applied to the ring 30, in closing the switch, is not imparted to the latch member, and the hooks 28 are free to ride over the keepers, the slight rotation of the latch member during the closing operation, being opposed merely by the pressure of the spring 29. A force on the actuating ring in a direction to open the switch, is imparted directly to the latching member causing the hooks to be rotated out of engagement with the keepers.

Turning now to the hinging means for the fuse cartridge, I provide, preferably on member 21, trunnions 31. The trunnions are adapted for pivotal disposition in hook-shaped bearing seats 32, formed in a hinge member 33, which is assembled on one of the brackets 12, along with one of the contact assemblies as shown. It may be pointed out that the cartridge is adapted to be disconnected and freely removed from the supporting structure for the purpose of replacing a disrupted fuse, but means are provided in the form of a projection 34, which serves to prevent any casual or accidental disconnection of the cartridge member.

The application of choke coils as protective devices used in connection with transmission lines is well known in the art, such coils serving to divert static, high frequency, and abnormal or severe disturbances in the transmission system. In many instances choke coils are installed in the line circuit directly ahead of a fuse or fuse-switch, and serve to prevent unnecessary blowing of the fuse element. The manner of mounting the choke coil directly on the fuse switch, embodied in the device of this invention, provides a compact combination unit which requires little mounting space on the cross-arm, and which, by virtue of the compactness of assembly, may be suspended or supported on a single cross-arm.

The choke coil 35 consists of a number of turns of solid wire, helically wound and rigidly held between a plurality of pairs of braces 36, of insulating material. At the upper terminus of the coil I provide a screw connector 37, for engaging the line. The opposite end of the coil is joined with connector 16 of the nearest contact assembly. For mounting and securing the coil I provide a U-shaped bracket 38 which has an eye portion turned about one of the bolts which clamps the band 9, the bracket being in gripping engagement therewith, and the bracket having its ends secured on opposite sides of one pair of coil braces 36. A strap 39 secured to another pair of coil braces, is provided with a slotted aperture for fastening to the bracket 12 as by means of the bolt 14. It will appear that the choke coil may be readily detached to permit substitution of one of a larger size or high voltage rating simply by disengaging the two bolts last referred to.

From the foregoing description it will appear that the described assembly may be manufactured and installed as a unit, and consists of a relatively small number of separate parts. The economy of manufacture and wide range of application of the device is however enhanced by the fact that the members 6 and 9 may be and preferably are of identical construction. Likewise the adapters 12 may be of identical construction, and obviously interchangeable. As described, the terminals appearing in Fig. 2 may likewise be the same at each end of the fuse cartridge. Each of the parts enumerated may be stocked and utilized as standard, for assembling combination units of a variety of capacities and for use in a variety of conditions. The arrangement described is advantageous in that it requires only a single insulator, which may be any one of a wide range of sizes, according to desired capacity of the assembly. The requirement of only a single insulator, and the bolted construction throughout, eliminates the time and expense incident to cemented insulator connections, and facilitates replacements in the field and the ready assembly of any of a number of desired sizes from a minimum parts stock.

As shown in the drawing, the assembly is by preference so associated with the bracket 3 as to provide an angle mounting of the fuse cartridge, as conducive to ease in distant manipulation of this member as by a fuse puller.

While I have shown and described a combination switch and choke coil assembly, the switch arm which comprises a removable fuse cartridge of expulsion type, it will be understood that a rigid non-fusible switch blade may be mounted in the structure in place of the fuse cartridge.

The interchangeability of fuse cartridge and non-fusible switch blade, in devices of the character described, is old in the art and forms no part of the present invention. It will be understood that a number of other changes may be made without departing from the full scope and intended spirit of the invention.

I claim as my invention:

1. An electrical unit including a unitary insulator member, a switch and a choke coil, means for supporting said switch and coil entirely from said insulator member, and including relatively spaced bracket portions extending between said coil and insulator member.

2. In an electrical unit including a switch and a choke coil, a single insulator for supporting the switch and coil, a connector fitting disposed near one end of said insulator and engaging opposite sides of said coil, a connector fitting near the opposite end of said insulator, said switch being carried on said fittings.

3. In an electrical unit including in combination an insulating element, a switch, and a choke coil, means for supporting the switch and coil entirely from said insulating element and including a connection between the choke coil and one end of the insulating element, a connection at the opposite end of the insulating element, said switch being supported on said end connections, and a hanger for the unit, connected to an intermediate portion of said element.

4. In an electrical unit, an insulating element, supports for switch members, carried by opposite end portions of the insulating element, a choke coil having insulating frame members along opposite sides thereof, brackets engaging said frame members and one of said switch supports, and a device for supporting the entire unit, secured to an intermediate portion of said insulating element.

5. In an electrical unit, an insulating element, a detachable collar secured about one end of said element, bracket members secured at opposite sides of said collar, a choke coil carried by said bracket members, and a hanger for the unit engaging said element and spaced from said collar.

6. In an electrical unit for outdoor service, a cylindrical, petticoated insulating element, brackets for a switch member, detachably secured to said element near opposite ends thereof, a choke coil, detachably carried by one of said brackets, and a hanger for the unit, detachably secured to the insulating element in spaced relation to each of said brackets.

7. In an electrical unit, an insulator, spaced supports engaging the insulator, switch contacts carried by said supports, a pivotally mounted switch blade adapted to engage said contacts, a choke coil carried by one of said supports, a hanger for the unit, engaging the insulator in spaced relation to the supports, and means for readily detachably connecting said parts at their points of engagement.

8. In an electrical unit, a single insulating base, a device detachably connected to said base for supporting the unit, spaced switch mounting members detachably secured to said base, switch terminals detachably associated with the mounting members, and a conducting member for connecting said terminals, a choke coil, and bracket members disposed on opposite sides at one end thereof, for mounting said coil on one of said supporting members.

9. In an electrical unit, a single insulating base, a device detachably connected to said base, for supporting the unit, spaced switch mounting members detachably secured to said base, switch terminals detachably associated with the mounting members, and a choke coil structure detachably secured to one of said mounting members.

10. In a disconnecting switch assembly, an insulating base, angulate switch mounting members carried by said base, and serving to space the switch assembly therefrom, each having an outer, slotted leg, switch terminals adjustably secured to the slotted portions of said mounting members, and a conducting member for connecting said terminals.

11. In a disconnecting switch assembly, an insulating base, angulate switch mounting brackets carried by, and projecting outwardly of said base, and each terminating in an elongate terminal-engaging portion, switch terminals associated with said mounting brackets, means carried by the brackets for selectively varying the distance between said terminals, and a conducting member for connecting said terminals.

12. In an electrical unit, a supporting device for the unit including a band of adjustable internal area, an extension on said band, an insulator support detachably connected to said band, an insulator intermediately engaged by, and detachably secured to the support therefor, spaced, stationary switch members, supports for the switch members, detachably secured thereto, said switch supports being of a construction similar to that of the insulator support, and detachably secured to the insulator near opposite end portions thereof, a fuse cartridge constituting a movable switch member in coacting relation with said stationary switch members, and a choke coil detachably carried by one of said switch member supports, near one end of the insulating element.

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