

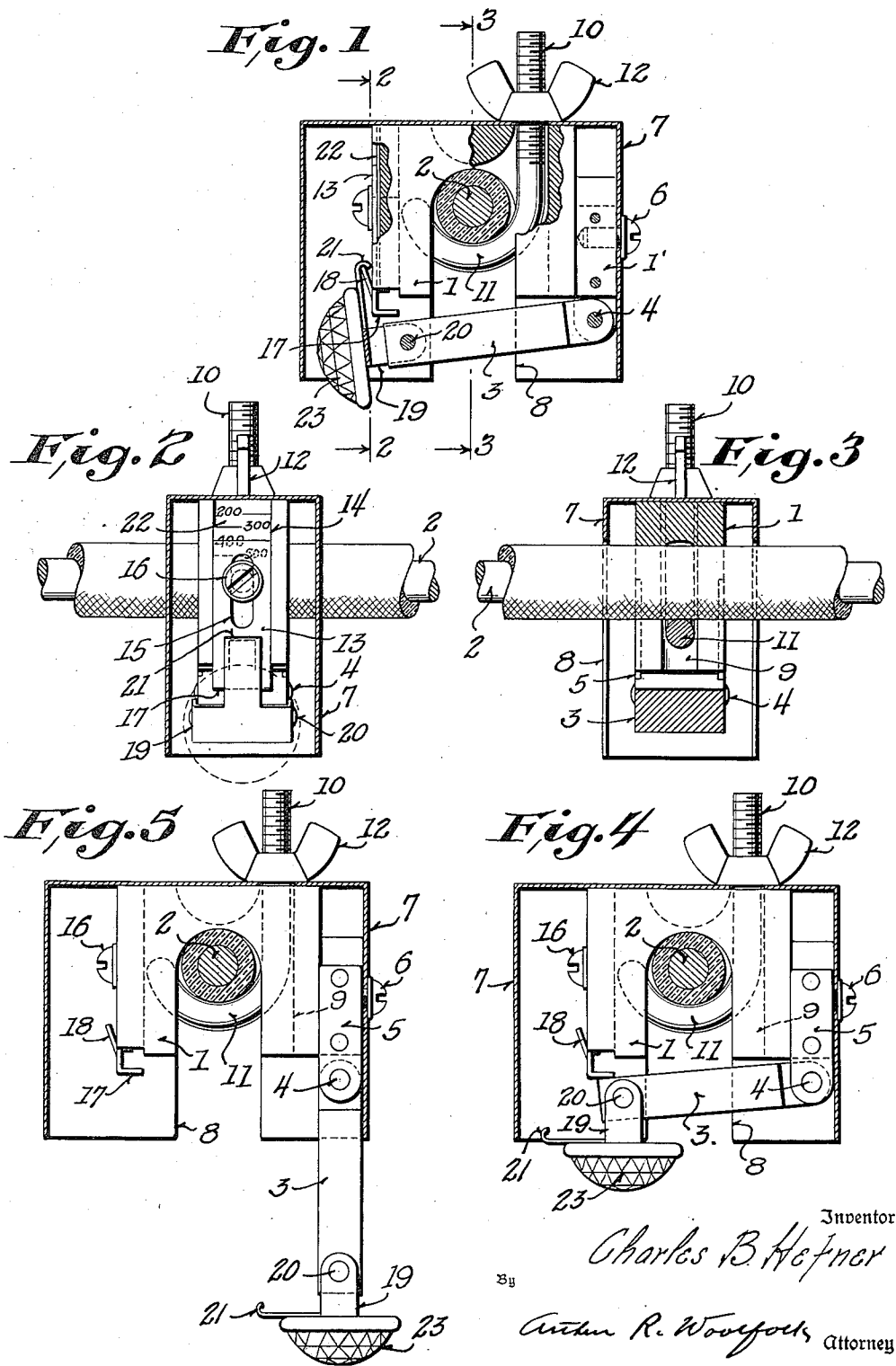
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OVER CURRENT SIGNAL DEVICE

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OVER-CURRENT SIGNAL DEVICE

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8 Claims. (Cl. 177—311)

This invention relates to over-current signal devices.

This invention is an improvement over that disclosed in my co-pending application, Serial Number 499,958 filed December 4, 1930, Patent 1,934,264 for Over-current signal means, and has the same general objects as those of my above noted invention.

In distribution systems it is frequently the case that a plurality of main branch lines lead out from a substation and are fed through a single automatic switch at the substation, so that if trouble occurs on any branch line, it will open the main switch for the entire group of branch lines and it becomes difficult to find which of the several lines is defective. It is difficult to inspect each line and considerable time is consumed when finding which of the several branch lines has the short circuit or other disturbance thereon.

Objects of this invention are to provide an over-current signal device which may be applied to any of the several branch lines, or, in fact, to any of the mains desired, which is so made that it will indicate a predetermined over-current in the line, and also will indicate even if the over-current has ceased that such a condition had obtained.

In other words, it gives an indication at the time the over-current occurs and also persists in this indication after the over-current has ceased until the device is again reset.

In greater detail, objects of this invention are to provide an over-current signal device which is so made that it can be carried upon the conductor itself and attached thereto without requiring any cutting or interrupting of the conductor and without requiring any electrical attachment thereto, the device being operated by the electromagnetic flux surrounding the conductor and thereby dispensing with the use of any auxiliary coils, taps, or other apparatus whatsoever.

Further objects are to provide a device which may be applied to a bare wire or to an insulated wire, and which when applied to an insulated wire does not damage the insulation on the conductor, but which nevertheless may be securely clamped or attached to the conductor in an easy and secure manner, which does not require the use of any special tools, which is so made that the active parts therein are shielded from the weather and may be placed out in the open if desired, or at any point along the conductor or main.

Further objects are to provide an over-current signal device in which a body portion and an armature jointly surround the conductor, the

body portion being preferably in the form of a yoke straddling the conductor and clamped thereto, and the armature being movably supported below the yoke, as by pivotally supporting it from the yoke for example, and provided with a latch, such latch being carried by the armature and being independently movable with respect to the armature, the latch itself carrying a display means, so that whenever the armature moves towards the yoke, the latch is released and the display means moved into a visible position from its former hidden position, irrespective of the position of the armature, so that the signal means is displayed although the armature may not drop away from the yoke or body portion and so that the signal means remains in displayed position even after the armature does drop away from the yoke or body portion.

In still greater detail, objects of this invention are to provide an over-current signal device in which the yoke carried by the conductor also adjustably carries a unitary catch and stop for the armature, the catch cooperating with the latch and the stop limiting the inward motion of the armature,—the catch being at a definite, permanently fixed position with reference to the end of the stop, so that for a predetermined motion of the armature the latch is always disengaged, the stop being adjustable to vary the over-current at which the apparatus will operate, and at the same time carrying with it the catch, so that during adjustment the two units comprising the catch and the stop are simultaneously adjusted.

Further objects are to provide a device having the above enumerated characteristics which nevertheless is of extremely simple and rugged construction, which may be cheaply made, which may be reset by a switch stick or any other simple means of this general type, and which is provided with a casing or housing which protects all of the active or movable parts from the weather without materially increasing the cost of the construction.

A still further object of this invention is to provide a simple and inexpensive means for securely attaching the device to the conductor, such means preferably taking the form of a U-bolt or hook shaped bolt guided by the yoke or body portion and clamping the conductor in place within the yoke.

An embodiment of the invention is shown in the accompanying drawing, in which:—

Figure 1 is a side elevation of the device with a portion of the casing sectioned off and with

certain parts of the device broken away and in section, such view showing the device with its parts in normal position.

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1.

Figure 4 is a view approximately corresponding to Figure 1 but showing the parts in the position they occupy at the instant that overload current flows through the conductor.

Figure 5 is a view corresponding to Figure 4 showing the position of the parts after the overload current has ceased.

Referring to the drawing, it will be seen that the device comprises a body portion or yoke 1 of magnetic material which straddles the insulated conductor 2 and which may, if desired, be of solid construction. It is to be appreciated, of course, that if it is ever desired, the body portion may be formed of laminated material. Similarly the armature 3, which is pivotally supported as indicated at 4 in proximity to the lower ends of the yoke 1, may be of solid magnetic material or may be laminated, the solid construction being shown in the drawing, as it has been found satisfactory in actual practice.

It is preferable to provide a rectangular lug or boss 1' integral with the body portion, upon opposite sides of which the supporting clips or straps 5 for the pintle pin 4 are riveted or otherwise secured. This lug is provided with a tapped hole to receive the screw 6, see Figure 1, which attaches the open bottom, box-like casing 7 of sheet metal to the yoke or body portion, the casing being cut away, as indicated at 8, to provide slots on opposite sides for accommodating the conductor or main 2.

The arms of the yoke are preferably formed with channels 9 on their inner sides and with openings extending in line with these channels and through the top of the body portion, as shown in Figure 1.

A U-shaped or hook shaped bolt 10 extends through one of these openings and is provided with a curved portion 11, see Figures 1, 4 and 5, which hooks beneath the conductor and whose free end is guided in the opposite channel. A wing nut 12 is provided so that the bolt may be drawn into a position to clamp the conductor against the body portion or yoke.

A unitary catch and stop is provided and may take the form of a metal plate 13 guided in a channel 14, see Figure 2, formed in the face of the body portion opposite that provided with the lug 1'. This metal strip is preferably provided with an elongated slot 15 through which a clamping screw 16 extends, so that the strip may be adjusted upwardly or downwardly for a purpose that will immediately appear. The lower end of this strip is provided with an intumed stop 17 for limiting the upward motion of the armature 3, as most clearly shown in Figures 1 and 4. Normally the armature is spaced a slight distance below the stop 17, as shown in Figure 1. The catch comprises a small lip or ear 18, see Figure 1, struck outwardly from the strip 13 and integrally therewith. This catch is in all positions of adjustment spaced a uniform distance from the stop 17. In other words, when the stop is moved up or down for adjusting the device to different values of current through the conductor, the catch 18, being integral with the stop 17, is always spaced therefrom a predetermined distance, irrespective of the setting of the device.

This catch cooperates with a latch which is pivotally carried by the armature. This latch may comprise a pair of spaced arms 19 pivoted by the pintle pin 20 to the free end of the armature and provided with an integral extension terminating in a hook 21 adapted to engage the catch 18 when the device is in normal position. When the stop 17 and catch 18 are adjusted by adjusting the strip 13, the armature is positioned nearer to or away from the poles of the yoke, and consequently will respond to a lesser or greater over-current in the conductor. The normal current after the device is set is such that it does not lift the armature and detach the latch. If desired, a small metal plate, indicated by the reference character 22 in Figures 1 and 2, may be carried by the body portion and provided with graduations and numbers to indicate the current for which the device is set.

In the operation of the apparatus the following sequence of events takes place:—When the current flowing through the conductor 2 is of normal value, the armature is not attracted upwardly towards the pole pieces of the yoke, but remains in the position shown in Figure 1. However, upon an excess current, the armature is drawn upwardly and consequently the latch 21 is detached from the catch 18 and the latch member rocks into the position shown in Figure 4, although the armature may still be held upwardly towards the yoke.

It is to be noted at this point that the latch member carries a signal means, such as the colored reflecting button 23, which is normally hidden but which drops into the exposed or displayed position shown in Figures 4 and 5.

In Figure 4 it will be noted that although the armature is held upwardly against the stop 17, that nevertheless the latch has rocked downwardly and the display means is visible even while the over-current persists. On the other hand, if there is a cessation of the over-current and the armature drops to the position shown in Figure 5, the latch adjusts itself and still remains in such a position that the display means is directed downwardly. It is therefore apparent that irrespective of the position of the armature, the display means is exhibited if an over-current has flowed through the conductor or is flowing through the conductor.

It is a simple matter for a lineman to flash his flash light upwardly even at night and the display means will reflect the light and give the indication that a disturbance has occurred on the conductor which carries this particular over-current device.

A point which is to be noted particularly is that the stop 17 and the catch 18 are spaced a certain distance apart and this spacing is maintained at all times, irrespective of the setting of the device, as the catch and the stop are formed integrally from the same strip of metal and adjustment of one, therefore, adjusts the other.

Further, if an overload should occur and suddenly cease, nevertheless the device will operate and remain in the position shown in Figure 5, thus displaying the signal means. On the other hand, if an over-current occurs and persists, the device will remain in the position shown in Figure 4 displaying the signal means.

It is obvious that the device could have two or more turns of the conductor wrapped around the yoke so that it would respond to a lower amperage if it were desired. However, the device would

preferably be supported directly by the conductor as described in detail heretofore.

Of course, if two or more turns were taken about the device, an insulated conductor would be employed, whereas if the device merely straddles the conductor, as previously described, it could be used with either an insulated or a bare conductor.

Further, it will be seen that the device may be bodily attached to the conductor in a simple and easy manner without abrading or cutting the insulation of the conductor and without requiring any opening of the conductor or connection thereto.

Further, the major parts of the apparatus, particularly the active or movable parts, are substantially housed by the downwardly opening, box-like hood or shield 7 so that abnormal weather conditions will not affect the operation of the apparatus.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. An over-current signal device comprising a conductor, an inverted U-shaped yoke of magnetic material straddling said conductor, a movable armature, means supporting said armature below said yoke, a catch supported from said yoke, a latch normally engaging said catch and normally holding said armature adjacent said yoke, said latch being released by motion of the armature towards said yoke, and signal means carried by said latch and movable with said latch from a normal position to a second position, said latch being movable with respect to said armature and being carried by said armature.

2. An over-current signal device comprising a conductor, an inverted U-shaped yoke of magnetic material straddling said conductor, a pivotally mounted armature below said yoke, a catch supported from said yoke, a latch normally engaging said catch and normally holding said armature adjacent said yoke, said latch being released by motion of the armature towards said yoke, and signal means carried by said latch and movable with said latch from a normal position to a second position, said signal means being pivoted at a point spaced from the pivot point of said armature.

3. An over-current signal device comprising a conductor, a yoke formed of magnetic material and mounted adjacent said conductor and forming a magnetic path for the magnetic flux about said conductor, an armature supported adjacent said yoke, said yoke and said armature substantially surrounding said conductor, a catch supported from said yoke, a latch carried by said armature and normally holding said armature in proximity to and slightly spaced from said yoke, said latch being movable with respect to said armature and being released when said armature moves towards said yoke, and signal means carried by said latch and movable with said latch from a normal position to a second position.

4. An over-current signal device comprising a conductor, a yoke formed of magnetic material, an armature pivotally supported at one end and mounted adjacent said yoke, said armature and said yoke substantially surrounding said conductor, a latch pivoted upon the free end of said armature, relatively stationary means normally engaged by said latch when said armature is spaced a slight distance from said yoke, said latch being biased towards releasing position and being released when said armature moves towards said yoke, and signal means carried by said latch, whereby said latch and said signal means are freely pivoted upon said armature and are movable from a normal position when said latch engages said stationary means to a second position when said latch is disengaged from said stationary means.

5. An over-current signal device comprising a conductor, a magnetic body portion, an armature pivoted adjacent one end and supported from said body portion, a latch pivotally carried by the free end of said armature, signal means carried by said latch, and a unitary catch and stop member carried by said body portion and adjustable thereon and normally engaged by said latch.

6. An over-current signal device comprising a conductor, a magnetic body portion, an armature pivoted adjacent one end and supported from said body portion, a latch pivotally carried by the free end of said armature, signal means carried by said latch, and a unitary catch and stop member carried by said body portion and adjustable thereon and normally engaged by said latch, said signal means biasing said latch towards releasing position and said armature being spaced a slight distance from said body portion when said latch engages said unitary stop and catch member.

7. An over-current signal device comprising a conductor, a body portion carried by said conductor and formed of magnetic material, a movable armature, means supporting said armature below said body portion, a latch pivoted to said armature, a catch carried by said body portion and normally interlocking with said latch, and signal means carried by said latch at a point spaced outwardly from the pivot point of said latch.

8. An over-current signal device comprising a casing having an open bottom and having slots on opposite sides, a conductor extending through the slots in said casing, a yoke formed of magnetic material and located within said casing straddling said conductor, an armature positioned below said yoke, a signal means actuated by said armature, and a hook bolt extending through said casing and clamping said conductor between itself and said yoke, said yoke having grooves on its opposed inner faces for guiding said hook bolt, said signal means and armature being located below and out of the way of said hook bolt.

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