Sept. 19, 1933. C. H. COLE 1,927,334

FUSE

Filed July 30, 1932

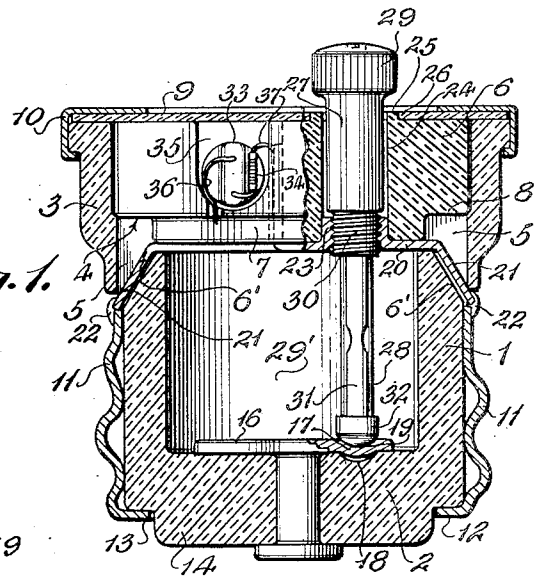


Fig. 1.



Fig. 6.

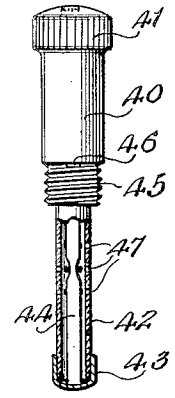


Fig. 5.

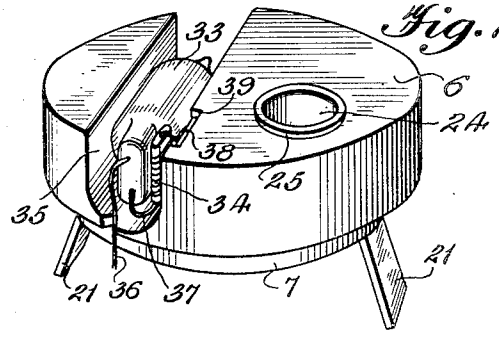


Fig. 2.

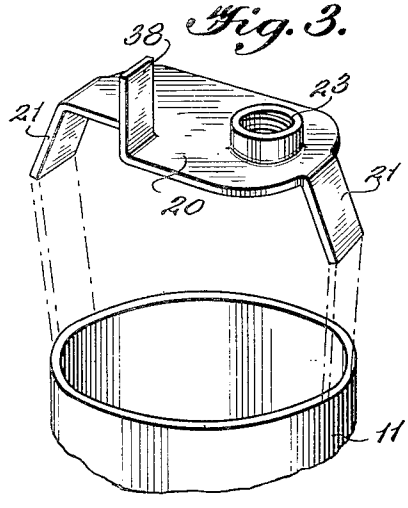


Fig. 3.

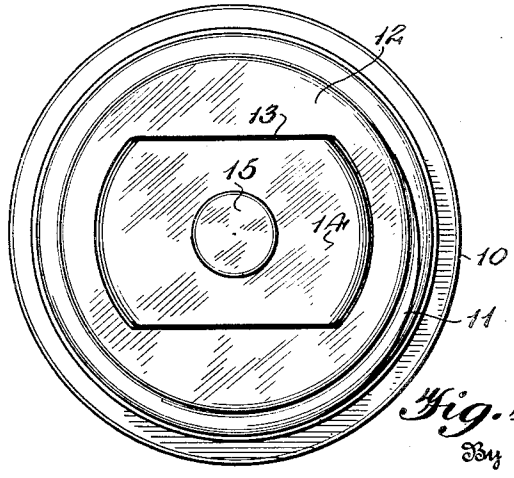


Fig. 4.

Inventor
Clarence H. Cole.

By William C. Linton.
Attorney

Patented Sept. 19, 1933 1,927,334

UNITED STATES PATENT OFFICE

1,927,334

FUSE

Clarence H. Cole, Washington, D. C., assignor to Engineering Appliance Corporation, Baltimore, Md., a corporation of Delaware

Application July 30, 1932. Serial No. 626,751

15 Claims. (Cl. 200—121)

This invention relates to an electrical fuse of the plug type employed in electrical installation to prevent damage by overloads and an object of the invention is to provide a fuse in which the cup-shaped body and filler closing the open outer end of the body may be formed by cold molding or die stamped and very cheaply produced.

Another object of the invention is to provide the body with an outer threaded shell and bridge which may be very easily and quickly applied to the body and united to each other by soldering, means being also provided to prevent the shell from turning about the body and tearing loose from the ends of arms forming part of the bridge.

Another object of the invention is to associate with the filler a plug carrying a fusible strip and permit the plug to be inserted or removed in order to substitute a new plug when the fuse strip of one in use has been burned without removing the entire plug from a socket of a fuse box.

Another object of the invention is to associate with the filler a glow lamp constituting a visible indicator which will be illuminated when a fuse strip in use has been burned through and not only serve as an indicator but also permit the defective fuse to be readily located in a dark cellar or cupboard and in addition permit the outer end of the fuse strip carrying plug insert to be easily seen and grasped.

Another object of the invention is to so locate the insert or plug carrying the strip of fusible material that when it is unscrewed turning motion applied to it will not be liable to rotate the body portion of the plug and cause it to become loose in its socket.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a sectional view through a plug of the improved construction;

Figure 2 is a perspective view of the filler forming a closure for the open outer end of the cup-shaped body of the plug;

Figure 3 is a perspective view of the bridge and a portion of the outer shell to which arms of the bridge are to be secured;

Figure 4 is a view in elevation looking at the inner end of the improved plug;

Figure 5 is a view of a modified form of the insert which may be used in place of the insert shown in Figure 1.

Figure 6 is a view looking at the outer end of the insert.

This improved fuse plug has a cup-shaped body formed of insulating material. The cup-shaped body 1 is closed at its inner end by a head 2 and has its annular walls increased in diameter near its open outer end to provide the walls with an offset outer portion 3 defining an internal circumferentially extending shoulder 4 from which shoulder lead passages 5 having inclined faces 6' and opening through the wall below the offset portion 3 of the walls. A filler or head 6 fits into the enlarged outer end portion of the body to close the same and has its inner end portion reduced as shown at 7 to define a circumferentially extending shoulder 8 which rests against the shoulder 4 and limits inward movement of the filler when it is set in place within the body. After the filler has been set in place a sheet of transparent material 9 such as mica, is applied to the outer end of the filler and a metal retainer ring 10 then applied to secure the transparent sheet and hold this sheet and the filler in place.

This plug is to screwed into a socket of a switchboard in the usual manner and in order to do so there has been provided a metal shell 11 constituting a side terminal for the plug. The outer surfaces of the walls of the plug are smooth but the shell is formed with threads and it should be noted that the internal diameter of the shell is such that the filler may be slid longitudinally into place about the body with the head 12 of the shell having flat contacting engagement with the inner end of the body. A substantially rectangular shaped opening 13 is formed in the head of the shell to receive a similarly shaped extension or lug 14 projecting from the head of the body and due to this arrangement the shell will be prevented from turning about the body and there will be no danger of the body turning in the shell when a plug is screwed into a switchboard socket or removed from the same. The usual center contact 15 extends through the center of the head 2 of the body and at its inner end has a flat head in the form of a disk 16 one portion of which is stamped as shown at 17 to engage in a recess 18 formed in the head 2 and prevent the center terminal from turning. The stamped portion 17 also forms a depression 19 constituting a seat, the purpose of which will be hereinafter brought out. Walls of the shell are to be bridged and in order to do so there has been provided a bridging strip 20 formed of metal and carrying at its end depending tongues 21. This bridging strip extends across the body diametrically thereof and is set in place before the filler 6 is applied with its arms extending downwardly through the passages 5 and resting against the inclined surfaces 6' with their ends projecting outwardly and secured to opposed portions of the shell by solder, as shown at 22. The bridge is formed near one end with an upstanding internally threaded neck 23 which projects upwardly into an opening or passage 24 formed through the filler and it should be noted that this opening or passage is formed eccentrically through the filler and at its outer end is encircled by a ridge 25 received in an opening 26 formed in the transparent sheet 9. Therefore, a plug or pin 27 can be easily inserted,

through the passage 24 with its reduced inner end portion 28 extending longitudinally through the chamber 29' of the body out of axial alinement with the body and center contact as shown in Figure 1. The plug or stem is formed of insulating material and has its outer end enlarged to form a knob 29 disposed externally of the body in order that the stem may be easily grasped and rotated and a portion of the stem which is of greater diameter than the reduced inner end portion 28 carries a metal sleeve 30 which is threaded for engagement with threads of the internally threaded nut 23 of the bridge. It will thus be seen that the stem when screwed into place will be firmly held and will have good contacting engagement with the bridge. A strip 31 of fusible material extends longitudinally of the reduced inner end portion 28 with one end attached to the threaded sleeve 30 and its other end joined to a terminal 32 which fits about the inner end of the stem and engages in the seat 19 when the stem is in place to establish good electrical contact with the center terminal 15 and assist in preventing the center terminal from turning through the head 2 of the body.

In order to indicate when the fuse strip 31 has been burned through, there has been provided a visible indicator in the form of a glow lamp 33 which together with a resistance 34 is mounted in a pocket 35 formed in the filler. This pocket extends transversely of the filler and opens through its outer end in order that when the glow lamp is illuminated, it may be seen through the transparent sheet 9. It should also be noted that the pocket in which the lamp is mounted is located adjacent the passage 24 through which the stem 27 passes and therefore when the lamp is illuminated light will be thrown upon the head or knob 29. Therefore, the lamp will serve not only to indicate that the fuse strip 31 has been burned through but also serve to illuminate the knob 29 and permit this knob to be easily located in a dark cellar or cupboard and the stem removed and a new one applied. Conductors 36 and 37 extend from the glow lamp, the conductor 36 being attached to the center contact 15 and the conductor 37 having the resistance 34 located intermediate its ends and at one end being attached to the upper end of a tongue 38 projecting upwardly from the bridge 20 through a passage 39 formed in the filler with its upper end communicating with the pocket 35. By this arrangement a very compact plug has been produced including a visible indicator adapted to be illuminated when the fuse is blown out. Under normal conditions current flows through the plug by way of the shell 11, bridge 20, fuse strip 31 and center contact 15 but when the fuse strip is burned through the current then passes from the bridge to the center contact by way of the tongue 38 and glow lamp 33 and causes the glow lamp to be illuminated and clearly indicate that the fuse strip has burned out. The plug stem can then be unscrewed and a new one set in place. The stem may be sold as a separate article of manufacture and provided with fuse strips of any capacity desired and therefore, if it is found that a fuse continues to blow out, it is merely necessary to purchase a stem having a fuse strip of a larger capacity.

The stem 40 shown in Figure 5 is somewhat different in its construction from that shown in Figure 1. This stem is formed of insulating material and has a knob 41 at its outer end and a reduced inner end portion 42 which is hollow instead of being solid. A cap or lower terminal 43 fits tightly about the inner end of the reduced portion and is engaged by a fuse strip 44 which extends through the reduced inner portion of the stem and has its other end bent transversely and engaged with the threaded metal sleeve 45 as shown at 46. Perforations 47 are formed to permit gases to escape when the fuse strip 44 is burned through.

It will also be noted that when the lamp is energized and the outer end of the plug illuminated, the capacity of the fuse strip marked upon the head of the plug as shown in Figure 6 will be clearly visible and there will be no danger of a plug carrying a fuse strip of an improper capacity being inserted in place of the one burned out.

I claim:—

1. A fuse comprising a cup-shaped body open at its outer end and having annular walls formed with side openings and a head at its inner end, a center contact extending through the head, a filler seated in said body between the side openings and outer end of the body and formed with a pocket opening through its outer surface and with an eccentrically located passage, a threaded metal shell fitting about said body and held against rotation thereon, a metal bridge in the body having arms extending through the side openings and united to said shell, a plug of insulation extending through said passage into said body and carrying a fuse strip having terminals contacting with the bridge and center contact, and a glow lamp in said pocket having conductors conected to the bridge and center contact.

2. A fuse comprising a cup-shaped body open at its outer end and having annular walls formed with side openings and a head at its inner end, a center contact extending through the head, a filler seated in said body between the side openings and outer end of the body and formed with a pocket opening through its outer surface and with an eccentrically located passage, a threaded metal shell fitting about said body and held against rotation thereon, a metal bridge in the body having arms extending through the side openings and united to said shell, said bridge being formed with an internally threaded neck projecting into the passage of said filler, a plug of insulation inserted through said passage into said body and having a turning head at its outer end, a threaded metal sleeve carried by said plug and threaded through said neck, a terminal at the inner end of the plug to engage the center contact, a fuse strip extending between the sleeve and terminal, and a glow lamp in said pocket having conductors connected to the bridge and center contact.

3. A fuse comprising a cup-shaped body open at its outer end and having annular walls formed with side openings and a head at its inner end, a center contact extending through the head, a filler seated in said body between the side openings and outer end of the body and formed with a pocket opening through its outer surface and with an eccentrically located passage, a threaded metal shell fitting about said body and held against rotation thereon, a metal bridge in the body having arms extending through the side openings and united to said shell, said bridge being formed with an internally threaded neck projecting into the passage of said filler, a plug of insulation inserted through said passage into said body and having a turning head at its outer end, a threaded metal sleeve carried by said plug and threaded through said neck, a terminal at the inner end of the plug to engage the center con-

tact, a fuse strip extending between the sleeve and terminal, a tongue extending upwardly from said bridge through said filler into said pocket, and a glow lamp in said pocket having conductors extending therefrom and connected one to said tongue and the other to the center contact.

4. A fuse comprising a cup-shaped body having a head at its inner side and open at its outer end and having side openings formed through its walls, outer surfaces of the walls being smooth between the side openings and inner end of the body, a metal shell fitting about said body, a bridge in said body having arms extending through the openings and attached to said shell, a center terminal extending through the head of the body, a removable plug extending through said body and carrying a fuse strip having electric connection with the bridge and center contact, and a glow lamp having conductors leading to the bridge and center contact.

5. A fuse comprising a cup-shaped body open at one end and having a head at its other end, a center contact extending through said head, a shell fitting about said body and slid into place, a bridge in said body having portions extending through walls of the body and attached to the shell, a closure for the open end of said body, a plug inserted into the body eccentric to the body and center contact and carrying a fusible element contacting with the center contact and having threaded engagement with said bridge, and a glow lamp carried by said closure and having conductors leading to the bridge and center contact.

6. A fuse comprising a cup-shaped body open at one end and having a head at its other end, a center contact extending through said head, a shell fitting about said body and slid into place, a bridge in said body having portions extending through walls of the body and attached to the shell, a closure for the open end of said body, a plug inserted through said closure into the body and carrying a fuse strip connecting the bridge and center contact, and a glow lamp having conductors leading to the bridge and center contact.

7. A fuse comprising a cup-shaped body open at one end and having a head at its oother end, a center contact extending through said head, a shell fitting about said body and slid into place, a bridge in said body having portions extending through walls of the body and attached to the shell, a closure for the open end of said body, a plug inserted through said closure into the body and carrying a fuse strip connecting the bridge and center contact, and a glow lamp having conductors leading to the bridge and center contact, said glow lamp being mounted in a pocket formed in the closure adjacent said plug whereby the lamp when illuminated may serve to disclose the outer end of the plug.

8. A fuse comprising a cup-shaped body open at one end and having a head at its other end, a center contact extending through the head, a shell about said body, a bridge in the body joined to the shell, a plug extending through said closure into the body and carrying a fuse strip connecting the bridge and center contact, and a glow lamp carried by said closure in circuit with the bridge and center contact and serving to illuminate the outer end of the plug when energized by fusing of the fuse strip.

9. A fuse comprising a cup-shaped body open at one end and having a head at its other end, a center contact extending through the head, a shell about said body, a bridge in the body joined to the shell, the closure being provided with an eccentrically located passage and the bridge having a threaded neck extending into the passage, a plug passed through said passage into said body, a threaded sleeve upon the plug engaging threads of said neck, a terminal at the inner end of the plug bearing against the center contact, a fuse strip extending between the sleeve and terminal, and a glow lamp carried by said closure in circuit with the bridge and center contact and serving to illuminate the outer end of the plug when energized by fusing of the fuse strip.

10. A fuse including a bridge, a center contact and a shell carried by said body, a plug insertable into the body and carrying a fuse strip to complete a circuit between the shell and center contact, and a glow lamp visible from a position externally of the body and in circuit with the shell and center contact, said lamp being positioned to illuminate the outer end of the plug when energized.

11. A fuse including a hollow body, spaced contacts carried by said body, a removable plug insertable into the body and carrying a fuse strip to complete a circuit between said contacts when the plug is in place, and a glow lamp visible from a position externally of the body and in circuit with the spaced contacts, said lamp being energized when the fuse strip burns out and serving to illuminate the outer end of the plug when energized.

12. A plug fuse comprising a hollow body, a contact sleeve surrounding said body, a bridge supported within said body, a center contact secured to said body, an indicator, a fusible element, said fusible element being supported by said bridge, and means for electrically connecting said indicator and fusible element with said contact sleeve and center contact.

13. A stem for fuse plugs consisting of an elongated cylindrical body, a knob formed with one end of said body, a threaded conductor ring secured to and surrounding the medial portion of said body, the end of said body opposite to that to which the knob is formed having a recess therein, a contact cap secured to said body and covering the opened end of said recess, a fusible element insertable within said recess and having electrical engagement with said conductor ring and contact cap, and said body having a plurality of openings formed therein communicating with the recess thereof.

14. A fuse unit comprising a body, a contact sleeve insertable over said body, means formed with said body for preventing the rotation of said sleeve thereon, a contact button, a conductor member for permanently connecting said contact sleeve to said body, a removable fusible member capable of engagement with said conductor member and said contact button, and means in circuit with said conductor member for visibly indicating the blown condition of said fusible member.

15. A plug fuse comprising a hollow body, a contact sleeve surrounding said body, a bridge insertable within said body and connected to said sleeve for permanently retaining the latter upon the body, a glow lamp indicator located within said body, a contact button, a fusible element supported by said bridge and having electrical contact with said contact button and said sleeve, and means for electrically connecting said glow lamp indicator to said sleeve and contact button whereby the ruptured condition of said fusible element may be visibly indicated.

CLARENCE H. COLE.