(No Model.)

H. A. WAGNER & F. SCHWEDTMANN.

ELECTRIC CUT-OUT.

No. 538,090. Patented Apr. 23, 1895.

Fig. 1.

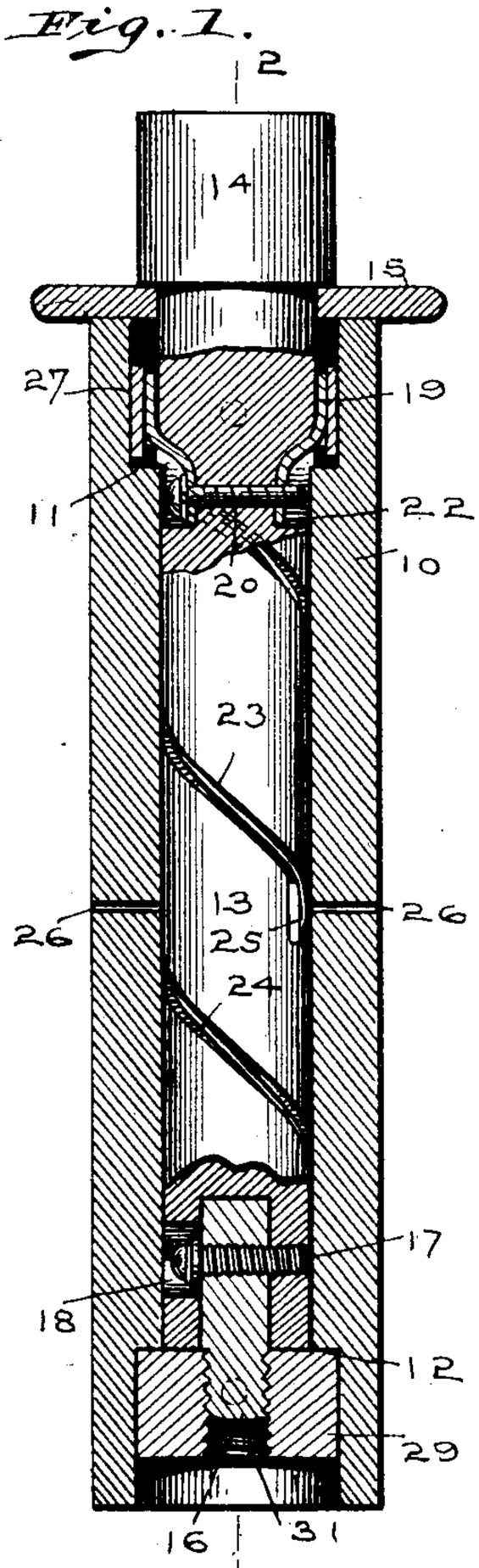


Fig. 2.

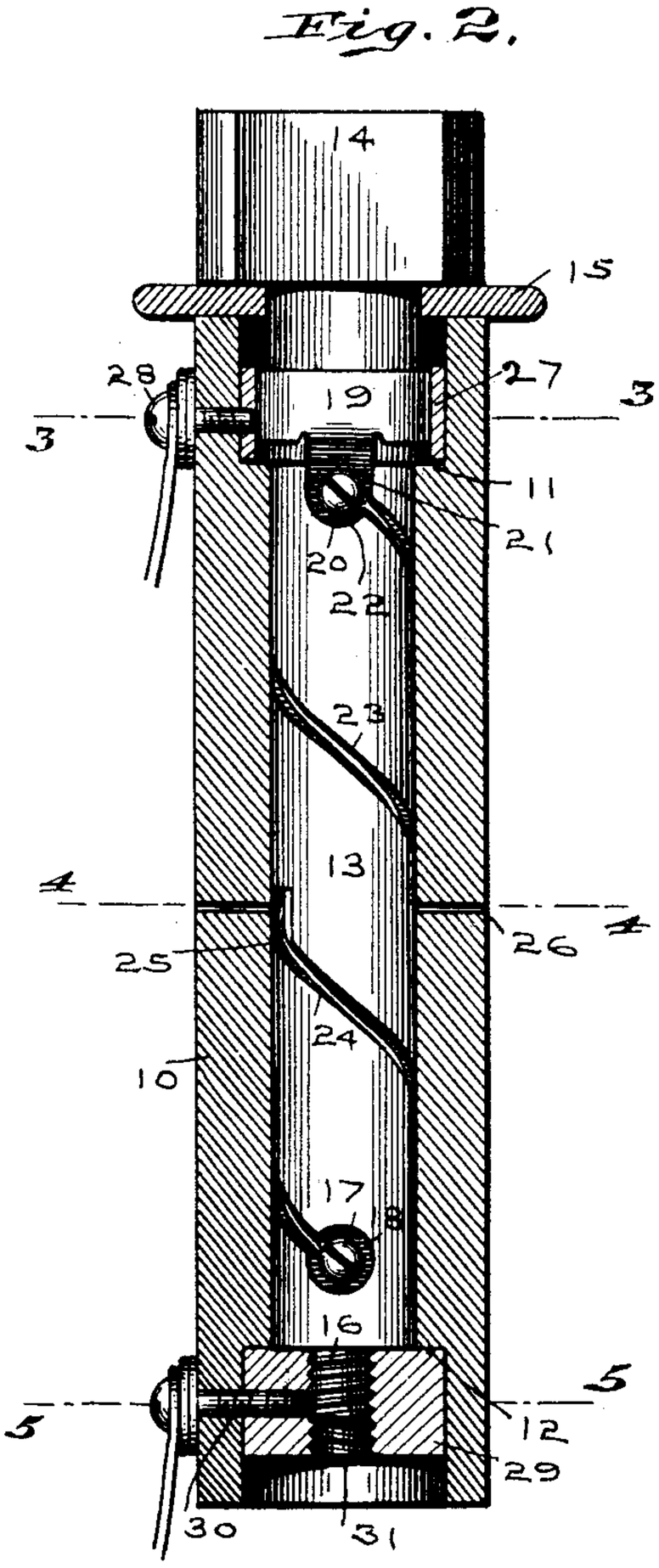
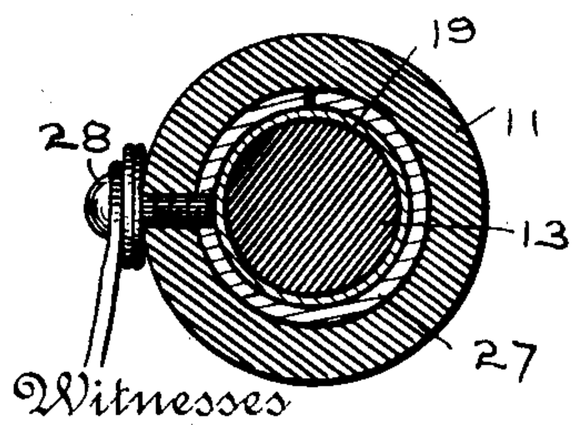
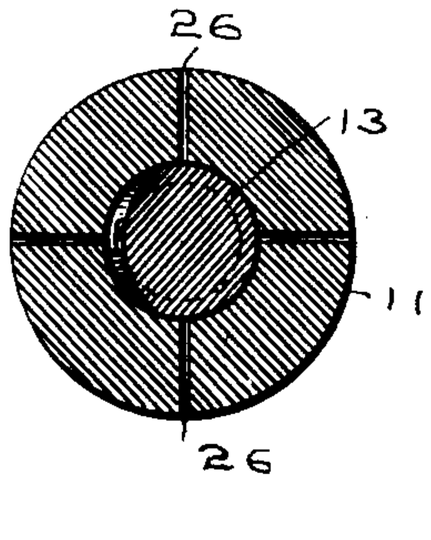


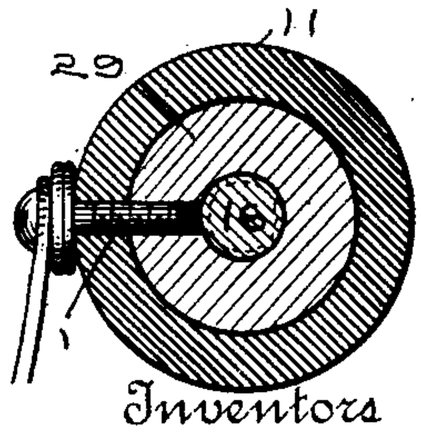
Fig 3.

Fig. 4.

Fig. 5.







Witnesses

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UNITED STATES PATENT OFFICE.

HERBERT A. WAGNER AND FERDINAND SCHWEDTMANN, OF ST. LOUIS, MISSOURI.

ELECTRIC CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 538,090, dated April 23, 1895.

Application filed January 5, 1895. Serial No. 534,000. (No model.)

To all whom it may concern:

Be it known that we, HERBERT A. WAGNER and FERDINAND SCHWEDTMANN, citizens of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Electric Cut-Out, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to a new and useful fusible or thermal cut-out for electrical circuits, and the object is to provide one more, especially for the protection of what are known as transformers, which are commonly placed in houses to reduce or transform the current from the main line for house-lighting or other purposes, but the cut-out may also be used for other purposes.

In the drawings, where the preferred form of our cut-out is shown, Figure 1 is a vertical section through our improved cut-out, a part of the inner core being in elevation. Fig. 2 is a similar view on the line 2—2 of Fig. 1, the inner core being entirely in elevation. Fig. 3 is a horizontal cross-sectional view on the line 3—3 of Fig. 2. Fig. 4 is a horizontal cross-sectional view on the line 4—4 of Fig. 2. Fig. 5 is a horizontal cross-sectional view on the line 5—5 of Fig. 2.

In all the views where like marks of reference refer to corresponding parts, 10 represents the outer shell of the cut-out, which is formed of a non-conducting material, such as hard rubber. This shell is cylindrical in form and is hollow or cored out, the interior of the shell being larger in diameter at the ends and forming two seats 11 and 12.

13 is a core which fits snugly within the shell 10, and is provided with a head 14, a washer 15 being usually interposed between such head at the top of the shell 10, when the core is put in place. The core and washer are of non-conducting material.

16 is a contact screw secured in the lower end of the core 13, and is held in place by a transverse screw 17, which passes through the screw 16 and through the core 13, a recess or depression 18 being formed in the side of the core. Near the upper end of the core 13 is a metal contact ring 19 secured around the core and held in place by a screw 20 which passes through ears 21 on such ring and through the core, a depression 22 being formed in the core for the head and end of the screw 20. Beginning at the depression 22 at the upper end of the core, a small groove 23 is helically cut in the outside of the core. This groove ends at the depression 18 in the lower end of the core.

24 is a small fusible wire which rests in the helical groove, and its ends are secured respectively under the screws 20 and 17. The core 13 is cut out on one side about its center as at 25 to form a small chamber into which the spiral groove 23 runs.

26 are small holes or perforations through the outer shell 10 on a horizontal line with the smaller chamber 25, and whose object will be hereinafter explained In the top of the shell 10, and seating on the seat 11, is a contact ring 27, this fitting closely to the core when the latter is in place.

28 is a screw or binding post to which one of the circuit or leading-in wires is attached on the outside of the cut-out, the screw extending through the shell 10 of the cut-out and into the contact ring 27.

29 is a contact plug in the lower end of the shell 10 of the cut-out, and seats against the seat 12, it being held in such position by the screw or binding post 30, which screws through the shell and into the plug. One of the circuit or leading-in wires is shown secured to the head of this screw, outside of the cut-out.

The plug 29 has a central screw-threaded opening 31, into which screws the contact-screw 16 of the core 13. When a current is passing through the circuit, it passes through the screw or binding post 28 to the rings 27 and 19, which are in contact with each other, thence to the fusible wire 24, and at the lower end of the core, it passes through the screws 16 and 17 to the plug 29, and thence out to the other leading-in wire.

The action of the device is as follows: Should from any cause an abnormal increase in current take place, the fusible wire will melt and interrupt the current, just as in other fuse devices, but heretofore it has been impossible with high electrical pressure or

voltage to prevent the current from continuing at times through the electric arc formed between the fused ends of the fusible wire. This arc not only prevents the device from fulfilling its object of cutting off the current, but it totally destroys the cut-out device, and often seriously damages the apparatus connected therewith. The object of our device is to prevent the formation or continuation of this destructive arc. It is well known that the distance through which an arc can be maintained is dependent on the electro-motive force or voltage between the terminals, and that with a given voltage there is always a limit beyond which the arc will not follow. It is possible therefore to prevent an arc from holding between fuse terminals by making the distance between them great. It is usually impossible to give the fuse the necessary length to accomplish this on account of the limited space such a device must occupy. Its equivalent is secured in our device by the use of the helical groove, in which the fuse is placed and which the arc would be compelled to follow, as the space between the fuse carrying the core and the outer shell is practically air tight. It is also known that an electric arc tends to follow a straight line and in our device it would be made to follow the lines of a helix. It has been found that an electric arc is almost impossible to maintain in a vacuum, and the more rarefied the air, the shorter distance the arc will follow, with a given electro-motive force. The arc formed momentarily between the ends of the melting fuse in our device, heats the air confined in the helical groove and spaces connected therewith to a very high temperature, causing its expansion to many times its former volume. The gases then rush through the vent 26, and the consequent rarefaction of that portion of the remaining gases follows. The metallic vapor and heated air necessary for the maintenance of the arc is also blown out and replaced by the pure rarefied air coming from the portions of the groove farthest away from the vent 26. The arc is therefore blown out and cut off almost at the moment of its inception. It is therefore apparent that the helical groove performs a double function and is extremely effective. With a fuse-carrying core less than four inches long, a large current at an electro-motive force of over five thousand volts may be safely interrupted or broken, without in any way injuring or impairing the device, excepting of course the fusible wire which is easily and cheaply replaced. This has never before been accomplished to our knowledge. It will thus be seen that all the damage that can be done, will be the burning out of the fusible wire, which can be readily replaced by unscrewing the core of the cut-out, removing it, and inserting a new wire and replacing the core.

There are but few parts in this device. It is easily repaired, and perfect protection against abnormal currents is secured.

The form of the cut-out is preferably as shown, but modifications may be made therein such as different shaped core, or form of curve of groove, &c., without departing from the spirit of our invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a cut out, the combination of an outer hollow shell, a core fitting therein and making closed joints therewith, a fusible wire carried in a groove in said core, electrical connections for said fusible wire, and suitable vents leading from said groove through said shell to the atmosphere, for the purpose set forth.

2. In a cut-out, the combination of an outer cylindrical shell, a removable core with a squared head fitting closely therein, a helical or curved groove around such core, a fusible wire in such groove, a contact ring around the core near its upper end, a screw or contact plug in the lower end of the core, the said fusible wire connected with such ring and screw, a contact ring in the upper end of the shell, and a contact plug in the lower end of such shell, such ring and plug connected with the leading-in wires, the contact plug and ring of the shell adapted to make contact with those of the core when it is in place.

In testimony whereof we have hereunto set our hands and affixed our seals, this 24th day of December, 1894, in the presence of the two subscribing witnesses.

HERBERT A. WAGNER. [L. S.]
FERDINAND SCHWEDTMANN. [L. S.]

Witnesses:
J. F. WESTON,
E. E. VERNELL.