

PATENT SPECIFICATION

191,852

Application Date : Oct. 25, 1921. No. 28,315 / 21.

Complete Left : Aug. 24, 1922.

Complete Accepted : Jan. 25, 1923.

PROVISIONAL SPECIFICATION.

Improvements in Protective Devices for Electric Circuits.



We, SIEMENS BROTHERS & Co. LIMITED, of Caxton House, Tothill Street, London, S.W. 1, a company registered under British law, and WILLIAM ETHELBERT GOODWIN, of 55, Dumbreck Road, Eltham, London, S.E. 9, a British subject, do hereby declare the nature of this invention to be as follows:—

The invention relates to improvements in electrical protective apparatus or devices and is particularly suitable for the protection of telephone, telegraph, railway signalling and other types of low tension electrical systems against lightning or other transient high-voltage disturbances.

Protectors have been suggested in which metal electrodes with a spark gap between are arranged in a sealed glass vessel containing gas at a reduced pressure.

According to the present invention we construct our electrodes of iron or nickel and the surrounding gaseous medium is an inert gas such as argon, neon, helium, nitrogen, or mixtures of such gases.

The length of spark gap is made such that with ensured breakdown at a given pressure a fairly wide variation of gas pressure is permissible.

Forms of protectors according to the invention are shown in the accompanying drawings in which:—Figure 1 is a sectional view and Figure 2 a projected view showing one form of the invention, Figure 3 is a section of a protector having electrodes of different form and Figure 4 a projected view thereof.

Referring to Figures 1 and 2, 1 is the glass container fitted with metal caps 2 and 3. These end caps 2 and 3 are cemented to the glass container 1 and are electrically connected to the metallic electrodes 4 and 5 by means of the conductors 6 and 7. The electrodes 4 and 5 are spaced by pieces of insulating material 8 and 9, the insulating pieces and the electrodes being secured together so as to form a self-contained unit 12. The insulators 8 and 9 are shaped with projections 10 and 11; the purpose of these projections being to break up any

arcs between the electrodes and also to minimise the effect of any deposition of metallic vapour during discharge which would ultimately lower the insulating resistance of the protector.

By this simple method of construction of the cathode unit 12, uniformity of spark gap is ensured by ordinary manufacturing processes.

The metallic electrodes 4 and 5 are of iron or nickel. The interior of the container 1 contains a quantity of gas at the pressure required to meet the conditions of the circuit in which the protector is used.

Horn-shaped electrodes of iron are particularly advantageous as any spark across the gap tends to be quickly lengthened by magnetic action.

In another form of the invention—that shown in Figures 3 and 4—the two metal electrodes 13 and 14 are of tubular shape, the inner electrode 14 being supported on a glass supporting tube 15, connection being made between the electrode and the metal end cap 16, by means of a wire 17 which is carried along inside the supporting tube 15. The other electrode 13 is supported by projections 18 and 19 which may be a part of the supporting tube 15 or separate details fixed thereon. Connection is made between electrode 13 and end cap 20 by means of the conductor 21.

The metal end caps shown in the drawing are shaped so that the protector can be easily fitted into spring clips. It is clear that the protector can take many forms with different electrode unit arrangement and having end caps to suit different mountings.

Dated this 25th day of October, 1921.

SIEMENS BROTHERS & Co., LIMITED.

The common seal of Siemens Brothers & Co. Limited, was hereto affixed by order of the Board.

G. CHAUVIN, Director.

W. WHEELER, Secretary.

For the Applicants.

COMPLETE SPECIFICATION.

Improvements in Protective Devices for Electric Circuits.

We, SIEMENS BROTHERS & Co. LIMITED, of Caxton House, Tothill Street, London, S.W. 1, a company registered under British law, and WILLIAM ETHELBERG GOODWIN, of 55, Dumbreck Road, Eltham, London, S.E. 9, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to improvements in electrical protective apparatus or devices generally termed protectors, such as are used for the protection of telephone, telegraph, railway signalling and other types of low tension electrical systems against lightning or other transient high voltage disturbances.

More particularly it consists in an improved protector of the kind in which metal electrodes are sealed in a vessel or container containing inert gas or gases.

It has been previously proposed to use iron electrodes in a protector containing a rare gas with an addition of other gas such as nitrogen and to use steel electrodes in a tube for illuminating purposes containing helium.

A protector according to the present invention has electrodes of iron or steel preferably gas freed which electrodes are of concave or cup shape, the concave faces of the electrodes facing each other. The surrounding gas may be argon, neon, helium, nitrogen, or mixtures of such gases, the length of the spark gap being arranged to give the breakdown voltage at the working gas pressure. As is well known by those trained in the art, considerable variation in the gas pressure makes very little difference in the breakdown voltage.

A preferred form of protector according to the invention is shown in the drawing accompanying this specification in which Fig. 1 is a sectional elevation, Fig. 2 a plan view and Fig. 3 is a sectional end view taken on the line X X of Fig. 1.

In the drawing 11 is a glass container fitted with metal caps 12 and 13. These end caps are cemented to the glass container 11 and are electrically connected to the metallic electrodes 14 and 15 by means of the sealed-in conductors 16 and 17. The electrodes 14 and 15 are of iron or steel, nickel steel being very suitable, and are cup-shaped, the concave surfaces facing each other. Tongues 18 and 18^a

are pressed out of the metal forming the electrodes and bent over. The sealed-in conductor 16 passes through a drilled hole in the tongue 18 and the end of the tongue is bent over at the drilled place and squeezed on to the remaining part of the tongue so as to clamp the conductor 16. The conductor 17 is likewise clamped to the tongue 18^a. To space the electrodes at the correct distance apart, a mica slip 19 is rivetted at its ends to the tongues 18 and 18^a and passes through slots 20 in the electrodes.

Electrodes of a bi-metal type may however be used so that on continued discharge across the gap, the bending of the heated electrodes brings them eventually into contact. For this purpose the electrodes are made up of iron or steel and a plate of another metal having a greater efficiency of expansion, the two plates of metal being secured to each other in a manner known in connection with bi-metallic strips. The compound electrodes are preferably of disc form and are so mounted that the bending of the discs when heated is towards each other so that they eventually touch.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a protector having metal electrodes sealed in a vessel containing inert gas or gases, concave or cup-shaped electrodes of iron or steel, the concave faces of the electrodes facing each other.

2. In a protector according to Claim 1 spacing the said electrodes apart by means of a mica strip.

3. A protector according to Claim 1 and in which the electrodes are made of iron or steel and a metal having a greater coefficient of expansion.

4. A protector for electrical circuits substantially as described and illustrated.

Dated this 24th day of August, 1922.

SIEMENS BROTHERS & Co.,
LIMITED.

The common seal of Siemens Brothers & Co. Limited, was hereto affixed by order of the Board.

WILLIAM O. SMITH,
Director.

D. C. MEFFAN,
For Secretary.

For Selves & Co-applicant.

2nd Edition

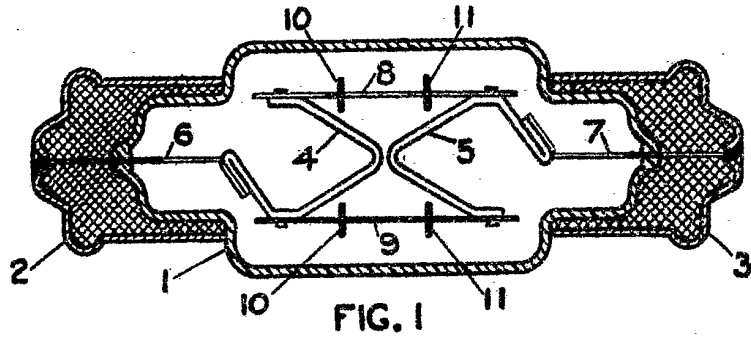


FIG. 1

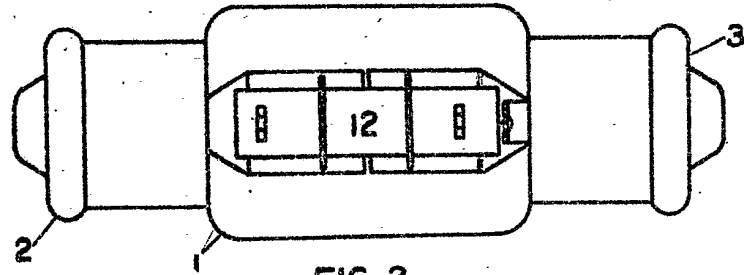


FIG. 2

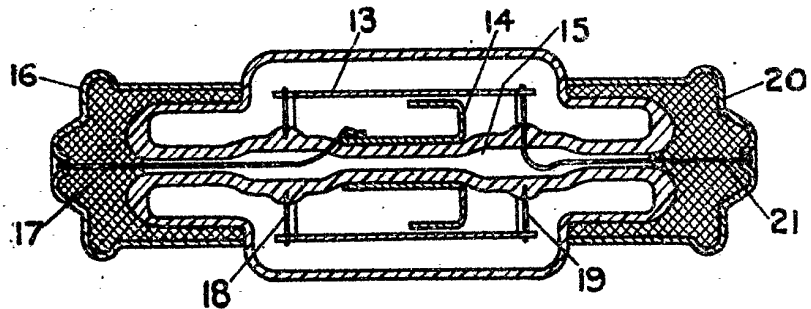


FIG. 3

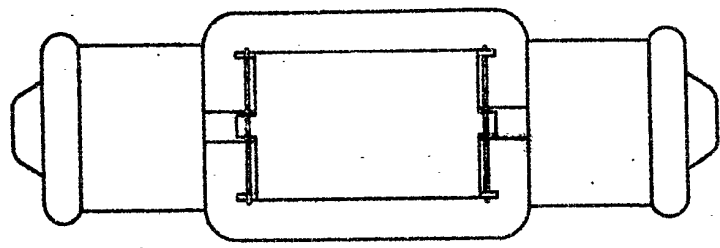


FIG. 4

[This Drawing is a reproduction of the Original on a reduced scale.]

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[This Drawing is a full-size reproduction of the Original.]

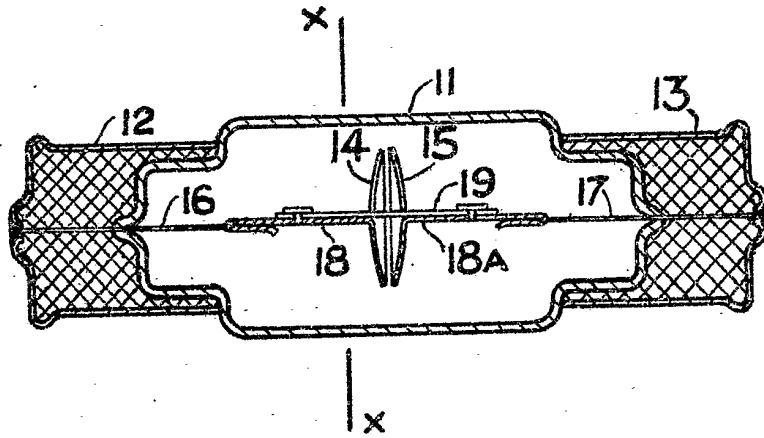


FIG. 1.

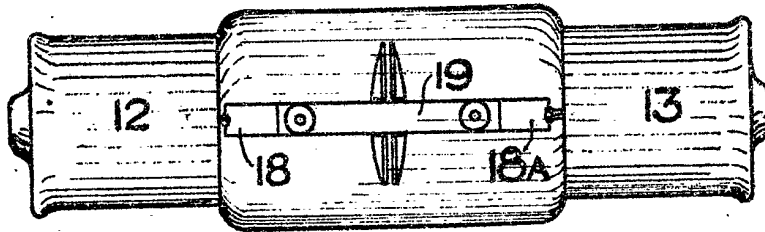


FIG. 2.

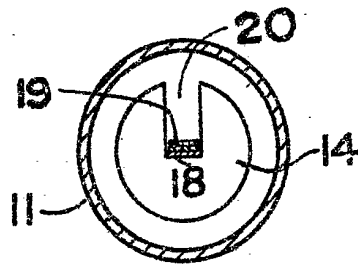


FIG. 3.