June 7, 1932. L. J. BUTTOLPH 1,861,621

COMBINATION GAP AND CONDENSER FOR HIGH FREQUENCY CIRCUITS

Filed Dec. 11, 1926

Fig. 1

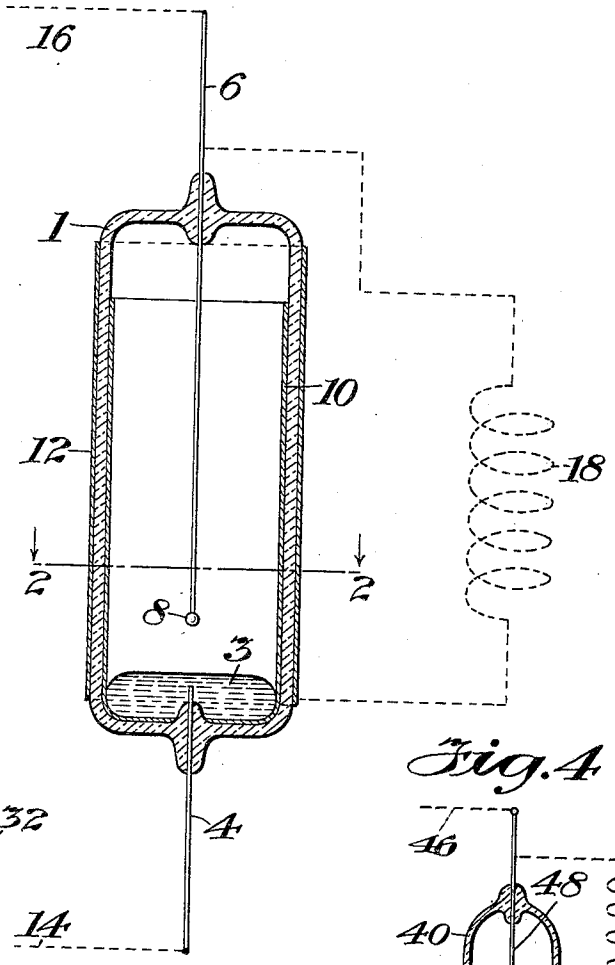


Fig. 3

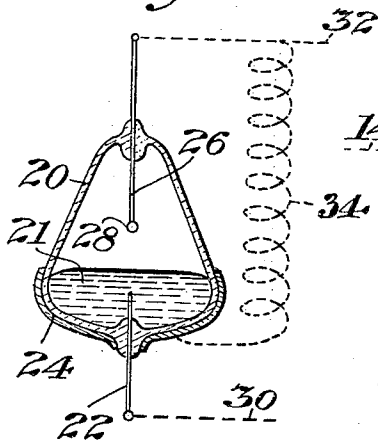


Fig. 4

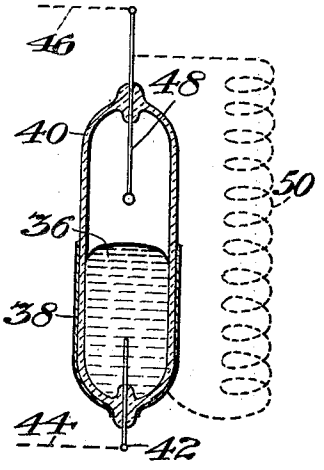
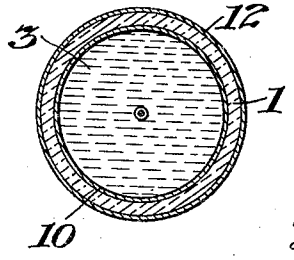


Fig. 2



INVENTOR
Leroy J. Buttolph
BY
Thos. H. Brown
HIS ATTORNEY

Patented June 7, 1932

1,861,621

UNITED STATES PATENT OFFICE

LEROY J. BUTTOLPH, OF GRANTWOOD, NEW JERSEY, ASSIGNOR TO GENERAL ELECTRIC VAPOR LAMP COMPANY, OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY

COMBINATION GAP AND CONDENSER FOR HIGH FREQUENCY CIRCUITS

Application filed December 11, 1926. Serial No. 154,065.

The present invention relates to a spark gap and condenser unit for use particularly in high frequency oscillating circuits and for use in the electrical arts generally.

Various objects and advantages of the invention will be obvious from the following particular description of forms of apparatus embodying the invention or from an inspection of the accompanying drawing; and the invention also consists in certain new and novel features of construction and combinations of parts hereinafter set forth and claimed.

In the accompanying drawing there is shown for purposes of illustration one form of apparatus with certain modifications thereof embodying the invention, in which

Fig. 1 is a section view in elevation illustrating somewhat diagrammatically an embodiment of the invention and part of a circuit in which it is connected,

Fig. 2 is a transverse sectional view along the line 2—2 of Fig. 1 looking in the direction of the arrows,

Figs. 3 and 4 are elevation section views of alternate embodiments of the invention.

In Figs. 1 and 2 the sealed envelope 1 which is of glass, fused quartz or the like, carries a body of mercury 3 with which contacts the lead-in 4 sealed through the envelope wall. A second lead-in 6 sealed in from the opposite end of the envelope carries a spark terminal 8 positioned in operative relation to said body of mercury 3. A condenser plate 10 of tinfoil or other suitable material is mounted on the interior surface of said envelope 1, is spaced away from said lead-in 6, and extends below the surface of said body of mercury 3 and thereby contacts with said lead-in 4. A cooperating condenser plate 12 is mounted on the outer wall of the envelope 1. This device is suitable for use in various oscillating circuits and for connections in various combinations with current sources and with other electrical apparatus such as inductances, condensers and so on well known in the art. In Fig. 1 are indicated parts of a circuit in which the unit above described is connected and in which the leads 14 and 16 connect the lead-ins 4 and 6 to a suitable source of varying or alternating current not shown and the inductance coil 18 is connected in series between said lead-in 6 and said condenser plate 12.

In Fig. 3 the envelope 20 has an extended lower surface on the interior of which rests the body of mercury 21 which serves to provide static condensing surfaces and also serves as a spark gap electrode, connection therefrom being made by the sealed in lead-in 22 which extends into the body thereof. A coating 24 of tinfoil or other suitable material on the outside surface of said envelope 20 in operative relation to said mercury 21 serves as a cooperating condenser member. The sealed in lead-in 26 has a terminal 28 which is spaced apart from said mercury 21 and cooperates therewith to form a spark gap. Connection is made from lead-ins 22 and 26 to mains 30 and 32 respectively of an oscillating circuit and from plate 24 through the inductance 34 to said main 32.

The device of Fig. 4 is somewhat similar to that of Fig. 3 except that the body of mercury 36 is extended vertically instead of horizontally. With this body of mercury 36 there cooperates a condenser couple, the outer coating 38 extending up the lateral sides of the envelope 40. The sealed in lead 42 is connected to a main 44 and on the inside of the envelope to said mercury 36 and a main 46 connects to the spark gap lead-in 48, and through the inductance 50 to said condenser plate 38. In any of these devices there is preferably used a material or atmosphere for quenching the spark and this material is either a filling of hydrogen, or alcohol vapor preferably at a pressure in the neighborhood of atmospheric pressure.

While I have shown and described and have pointed out in the annexed claims certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms, parts and details of the devices illustrated and in their operation and connection to and in electric circuits may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. A combined condenser and spark gap comprising a sealed envelope containing a

mercury pool, two inleads sealed through the wall of said envelope, one of said inleads terminating in said pool and the other terminating in a spark terminal spaced therefrom, a metallic conductor covering the major portion of the inner surface of said envelope, said conductor being electrically connected to one of said inleads, and another metallic conductor on the exterior surface of said envelope in substantial registration with said first mentioned conductor.

2. A combined condenser and spark gap comprising a sealed envelope containing a mercury pool, two inleads sealed through the wall of said envelope, one of said inleads terminating in said pool and the other terminating in a spark terminal spaced therefrom, a metallc conductor coverng the major portion of the inner surface of said envelope, said conductor being electrically connected to one of said inleads, another metallic conductor on the exterior surface of said envelope in substantial registration with said first mentioned conductor and an arc suppressing gas in said envelope.

Signed at Hoboken, in the county of Hudson and State of New Jersey, this 4th day of December, A. D. 1926.

LEROY J. BUTTOLPH.