CONDENSER

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Fig. 1

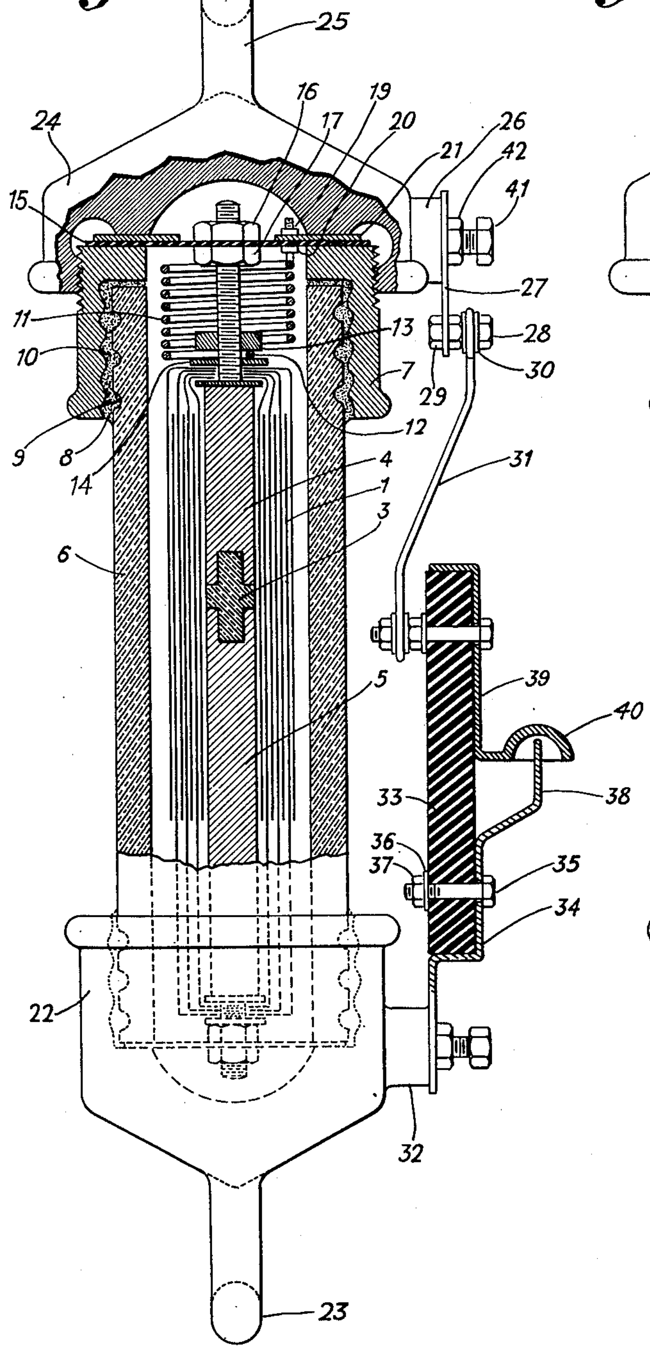
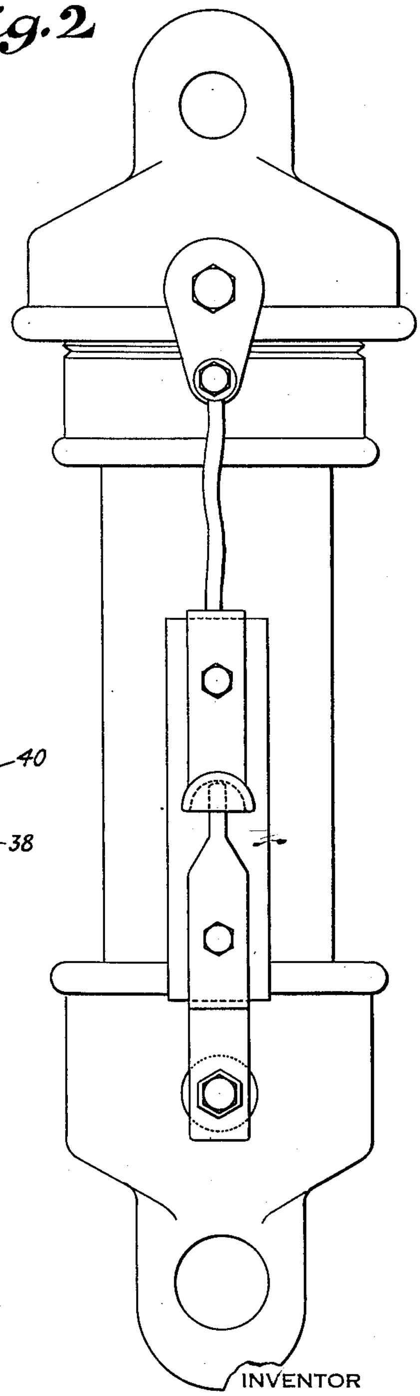


Fig. 2



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CONDENSER

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11 Claims. (Cl. 250—16)

This invention relates to an improved condenser and is particularly adapted to condensers known as the antenna sleet-melting type, provided with a suitable device for protecting the condenser against lightning.

An object of this invention is to simplify and improve sleet-melting condensers and to insure protection against the formation of a steep wave-front voltage, such as is caused by lightning, during thunder storms.

Another object of this invention is to provide a condenser which will be of greater utility without the need of constant attention.

Still another object of this invention is to provide a rugged, compact antenna sleet-melting condenser which has a self-contained inductance connected in series with the condenser and an external fuse and spark gap, all of which provide adequate protection against the formation of steep wave-front voltage surges caused by lightning.

In condensers used in connection with antenna structures which are subject to being loaded down with ice during periods of sleet formation, it has been found advisable to make arrangements for heating the wires to remove such ice formation. In this connection it has frequently been the practice to employ condensers which pass radio-frequency currents, but which will serve to isolate the currents used for heating the wires, thus making possible the segregation of antenna conductors into circuits through which heating current can be passed for melting off accumulations, or to prevent the formation of sleet. These condensers are normally called sleet-melting condensers. In the past there have been many failures of these sleet-melting condensers due to excessive voltages induced by lightning discharged in the vicinity of the antenna.

Therefore, as mentioned above, it is an object of this invention to provide a condenser with means for protecting these condensers from excessive voltages.

In the prior art it has been customary to remove sleet-melting condensers at such periods of the year when lightning discharges are likely to occur. This naturally involves considerable expense and by this invention it will no longer be necessary to remove the sleet-melting condensers from the antenna structure.

This invention involves the use of a small inductance coil placed in series with the sleet-melting condenser which is desired to be protected and a spark gap and fuse connected in shunt with the condenser and inductance.

This invention will be more fully understood by referring to the accompanying drawing, in which—

Fig. 1 is a cross-section of an improved condenser, and

Fig. 2 is a side elevation of Fig. 1.

Referring now to the drawing, the condenser 1, which is the ordinary roll type non-inductive condenser composed of alternate layers of metallic foil and insulating material wound upon a mandrel 2 which is composed of a central insulating member 3 and two terminal end members 4 and 5. The condenser is placed within an insulating casing or housing 6 which has fastened at both ends a metallic end cap 7 which is rigidly secured to housing 6 by means of suitable cement 8 firmly keyed to grooves 9 and 10. At one end of the casing a small inductance coil 11 is connected to condenser 1 at a point 12 by means of a suitable nut 13 and washer 14. The upper end of the coil is secured to an insulating disc 15 which is retained by suitable nuts 16 and 17, the upper end of the coil being connected by nuts 19 and 20 to a metallic washer 21. It will be noted that the electrical circuit from the connection to the upper cap passes through the metallic washer and then through the wire inductance coil to the upper terminal 4 of the condenser mandrel, the lower terminal mandrel 5 directly connecting the lower end of condenser 1 to the end cap 22. This end cap is provided with a lug 23 for mechanically securing the condenser to the antenna. The upper end of end cap 7 is threaded to receive a mechanical securing member 24 which is provided with a mounted lug 25 similar to lug 23 in the end of member 22. A boss 26 is arranged on member 24 for securing a lug 27 which is provided with suitable bolts 28 and nuts 29 and washers 30 for a fuse 31, this fuse being a 50-ampere bare wire. However, this could be any other type, such as is used on general power lines.

On end cap 22 a boss 32, similar to boss 26, is arranged for securely mounting an insulating block 33 which is retained in place by a metallic strip 34 by means of a bolt 35 and washers 36 and 37. The member 34 is tapered at the end to form one end of a spark gap at point 38. The upper end of the insulating block 33 is provided with a metallic strip 39 which terminates in a hollow semi-spherical member 40 which serves the dual purpose of a rain shield and the other member of the spark gap. The bosses 26 and 32 are also provided with a terminal screw 41 and nut 42. The spark gap is set with such a spacing that it can be generally relied upon to remain open except in cases of excessive voltage. In order to make this gap reliable, it is necessary to use a fairly large spacing. The voltage necessary to break down such a gap is sometimes in excess of the voltage for which it is practical to build sleet-melting condensers. Accordingly, a simple spark gap connected in parallel with an ordinary sleet-melting condenser does not afford sufficient protection. Therefore, by the placing of the inductance 11 in series with condenser 1, the steep wave-front of the lightning voltage builds up a sufficiently high voltage across inductance coil 11 to break down the spark gap before the condenser has been charged to a sufficiently high voltage which would damage the entire condenser structure.

The fuse 31 has such a current-carrying capacity that it will not be melted for the average current induced by lightning discharges. However, in case the spark gap should become short-circuited due to having been accidentally deformed, or due to the presence of foreign conductive materials, then the fuse would melt if, upon application of heating current for melting off accumulations of ice, this heating current should pass through the fuse instead of through the portion of the antenna wire system intended. Otherwise the introduction of this spark gap might prevent ice from being melted from certain portions.

Although only one modification of this invention has been shown, it will be apparent that this invention may be applied to other types of sleet-melting condensers in a similar manner. It will also be apparent that different types of sleet-melting condensers will require slightly different arrangements of the requisite parts, namely, the self-contained inductance coil, fuse and spark gap, for example, a metallic casing with one or more insulated terminal connections, supplied with series inductance and shunting spark gap and fuse.

Therefore, this invention should not be limited to the modification shown, except such limitations as are clearly imposed by the appended claims.

I claim:

1. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, an inductance located at one end of said casing and electrically connected in series with said condenser.

2. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, a metallic mandrel subdivided in the central portion of said condenser by an insulated member, an inductance electrically connected in series with said condenser between said metallic end members.

3. A sleet-melting roll condenser comprising a casing, end members having securing means for supporting said condenser, an inductance located at one end of said condenser and electrically connected in series between said metallic end members, and an external spark gap in shunt with said condenser and inductance.

4. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, a metallic mandrel sub-divided substantially in the central portion thereof by an insulated member located at one end of said casing and an inductance electrically connected in series with said condenser between said metallic end members, and an external spark gap in shunt with said condenser and inductance.

5. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, a metallic mandrel sub-divided substantially in the central portion thereof by an insulated member, terminal means at one end of said mandrel for connecting said condenser, and an inductance electrically connected in series with said condenser and between said metallic end members, and an external spark gap in shunt with said condenser and inductance.

6. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, an inductance electrically connected in series between said metallic end members, a fuse located on the outside of one end member and a spark gap located on the outside of the other end member, said spark gap and said fuse connected in series with each other and in shunt with said condenser and said inductance.

7. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, an inductance electrically connected in series between said metallic end members and said condenser, an external fuse and spark gap in shunt with said condenser and inductance.

8. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, an inductance electrically connected in series between said metallic end members and said condenser, a protective external spark gap and a single fuse wire connected in series with each other and in shunt with said condenser and inductance.

9. A sleet-melting roll condenser comprising an insulating casing, metallic end members having securing means for supporting said condenser, an inductance electrically connected in series between said metallic end members and said condenser, an external spark gap having a hollow semi-spherical shield connected in shunt with said condenser and inductance.

10. An electrical condenser comprising an insulating casing, said condenser and an inductance both located within said casing, metallic end members secured to said casing, means for protection against steep wave-front voltages, said means comprising said inductance an external fuse wire and a spark gap connected in series with each other and connected in shunt with said condenser and said inductance.

11. An electrical condenser comprising an insulating casing, said condenser and an inductance both located within said casing, metallic end members secured to said casing, said metallic end members having apertures at each end for mechanically securing the condenser to external mounting means, means for protection against steep wave-front voltages, said means comprising said inductance an external fuse wire and spark gap connected in series with each other and in shunt with said condenser and said inductance.

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