June 13, 1933. H. A. EWEN 1,913,978

INDUCTANCE AND CAPACITY

Filed June 12, 1930

Fig. 1

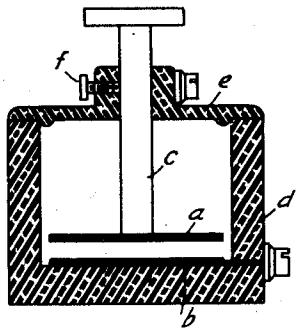


Fig. 2

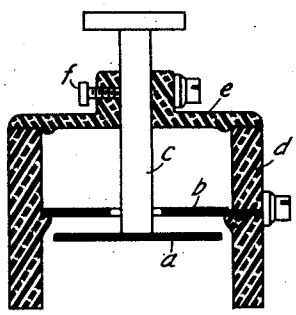


Fig. 3

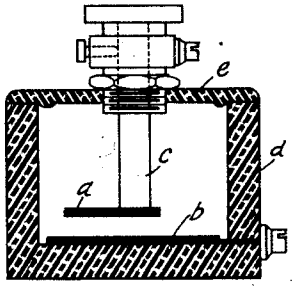


Fig. 4

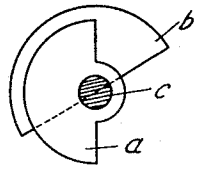


Fig. 5

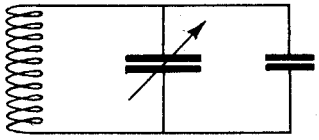


Fig. 6

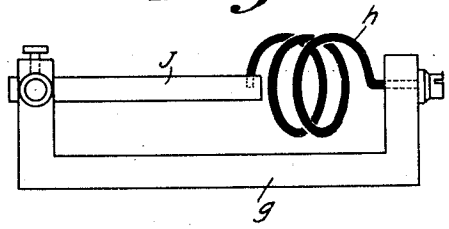
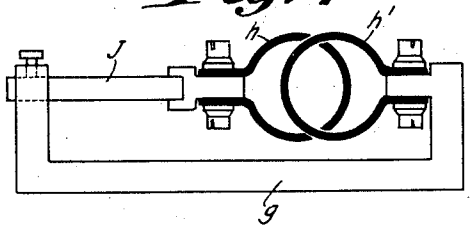


Fig. 7



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UNITED STATES PATENT OFFICE

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INDUCTANCE AND CAPACITY

Application filed June 12, 1930, Serial No. 460,568, and in Great Britain June 14, 1929.

This invention relates to inductances and capacities for use with electrical resonant circuit arrangements, and has for its object to provide a correcting arrangement whereby undesired changes of frequency, due to temperature changes in the elements of an ordinary tuned circuit or the like, may be compensated.

According to this invention undesired change of frequency in the elements of an ordinary tuned circuit or the like is compensated for by connecting into or associating with said circuit an auxiliary inductance or inductances and/or a capacity or capacities which is or are so constructed as to vary with temperature to an extent necessary to compensate for the variation in the constants of the main inductance and condenser in the circuit to be corrected.

Preferably the auxiliary device or devices is or are itself or themselves variable, i. e. is of the type wherein the capacity or inductance at a given temperature may be varied.

The invention is illustrated in the accompanying drawing; in which:

Figure 1 shows a condenser constructed in accordance with the present invention,

Figures 2 and 3 show a modification of the arrangement shown in Figure 1,

Figure 4 shows an open view of Figure 3 with the closing removed,

Figure 5 shows a circuit arrangement including one of the capacities shown in Figures 1 to 4 inclusive.

Figure 6 shows an inductance of constant characteristics, while;

Figure 7 shows a modification of the arrangement of Figure 6.

Referring to Figure 1 which shows a condenser suitable for use as an auxiliary condenser for carrying the present invention into effect, the said condenser comprises a pair of conductive plates *a*, *b*, located opposite one another, said plates being carried by members whose coefficient of temperature expansion is different. As shown, one plate is mounted upon a copper rod *c* or other rod having a relatively large temperature expansion coefficient, while the other plate is mounted upon a frame *d* of silica or other material of relatively low temperature expansion coefficient. The plate *b* is fixed to the bottom of the pot-like carrier *d* of silica, while the copper rod passes through a fixing hole in a cross piece *e* carried by the top of the carrier. The rod may be fixed in any desired position by means of a set-screw *f*. With this arrangement the capacity of the condenser will increase with temperature. If the opposite effect is desired, the electrode fixed to the pot-like carrier may be arranged above the "floor" thereof or as shown in Figure 2 the "floor" may be omitted and the electrode fixed about mid-way along the wall. The electrode *b* is formed with a central hole through which the rod *c* carrying the other plate *a* passes, so that said other plate is on the side of the first plate remote from the cross piece.

The arrangement thus described, though capable of capacity adjustment by moving the copper rod in the cross piece, is not convenient for tuning and is therefore most suitable for use in fixed tuned circuits. In a preferred construction shown in Figures 3 and 4 whereby variable capacity is obtained, concentric arcuate plates are employed, one plate being fixed to the carrier *d* of silica or the like and the copper rod carrying the other plate being arranged to be rotatable. The construction will be obvious from Figure 3. It will be seen that by rotating the rod *c* the capacity of the condenser constituted by the arcuate plates will be varied. This arrangement is very suitable for correcting a circuit such as a wavemeter which can be tuned to different frequencies. Such a corrected wavemeter

circuit is shown diagrammatically in Figure 5.

In the modification shown in Figure 6, which shows an inductance coil suitable for use in carrying out the invention a silica frame *g* is employed to support one end of the coil *h* the other end being carried by a rod J of copper or the like arranged to be clamped in any desired position in the frame as shown. With this construction increase in temperature increases the value of the inductance.

Figure 7 illustrates a modification of the arrangement shown in Figure 6 in which two inductance coils *h*, *h'* are employed, one being carried by the frame *g* and the other by the rod *j*. As shown any increase in temperature increases the mutual inductance between *h* and *h'* though obviously the opposite effect may be obtained by arranging the coils outside the silica frame and the rod *j* being passed through a suitable positioned hole in one wall of the frame i. e. by employing a construction analogous to that shown in Figure 2.

It will be seen that the invention has the advantage that the main components of an oscillatory circuit to be corrected may be of standard design and constructed of materials which whilst giving rise to changes due to temperature variations, are convenient or cheap for manufacturing processes or have other advantages such as lightness or strength which are important for the purpose in view. It also enables an existing apparatus to be corrected where the requirements of service renders this necessary.

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

1. A temperature compensating reactance comprising a supporting member of silica, a reactance element, means for fastening said element at one terminal to said supporting member, metallic means, means for adjustably mounting said metallic means on said support, said metallic means having a co-efficient of expansion different than the co-efficient of expansion of said support member, and means for fastening the other terminal of said reactance element to said metallic means.

2. A temperature compensating reactance comprising a silica support, housing an inductive reactance element, means for fastening one terminal of said reactance to said silica support housing member, metallic means adjustably mounted on said silica support housing, said last named metallic means having a coefficient of expansion different than the coefficient of expansion of the silica support housing, and means for fastening the other terminal of said inductive reactance to said metallic means.

3. A constant frequency reactance comprising a plurality of inductive turns, a silica support for one terminal of said reactance, an adjustable metallic support for the other terminal of said reactance, said adjustable metallic support being carried by said first named support and having a different coefficient of expansion than said first named support whereby the effect of a change in temperature on the physical character of said reactance is compensated.

4. A temperature compensating variable condenser comprising a silica support housing, a fixed arcuate electrode supported within said housing, outside connecting means for said fixed electrode, a movable arcuate electrode supported on one end of a metallic rod, said metallic rod being adjustably supported from said silica support housing.

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