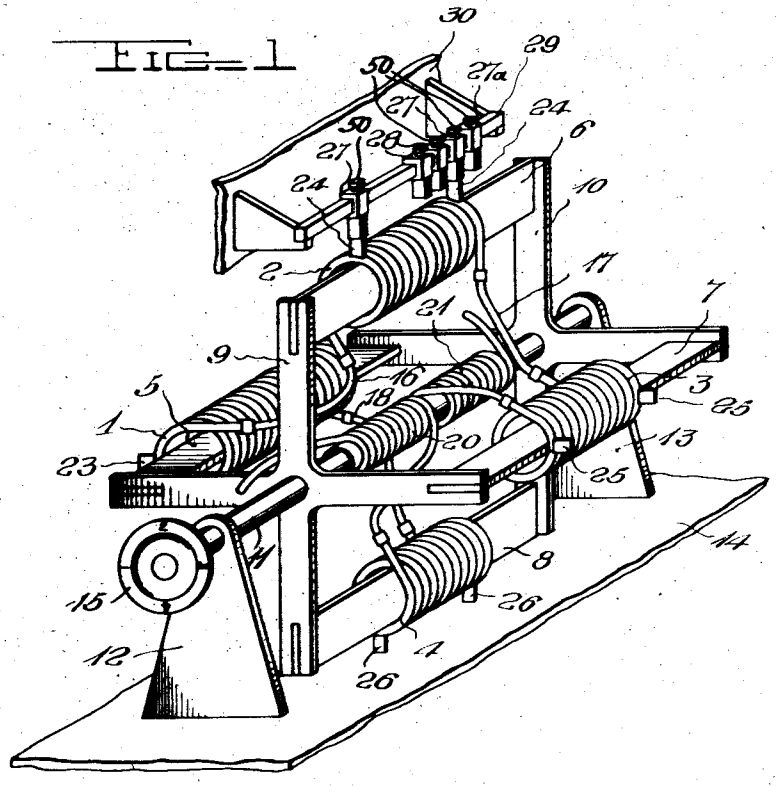
June 10, 1930. L. A. GEBHARD 1,763,233

INDUCTANCE SYSTEM

Filed March 9, 1929 3 Sheets-Sheet 1

FIG. 1



Inventor

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By Harold Dodd.

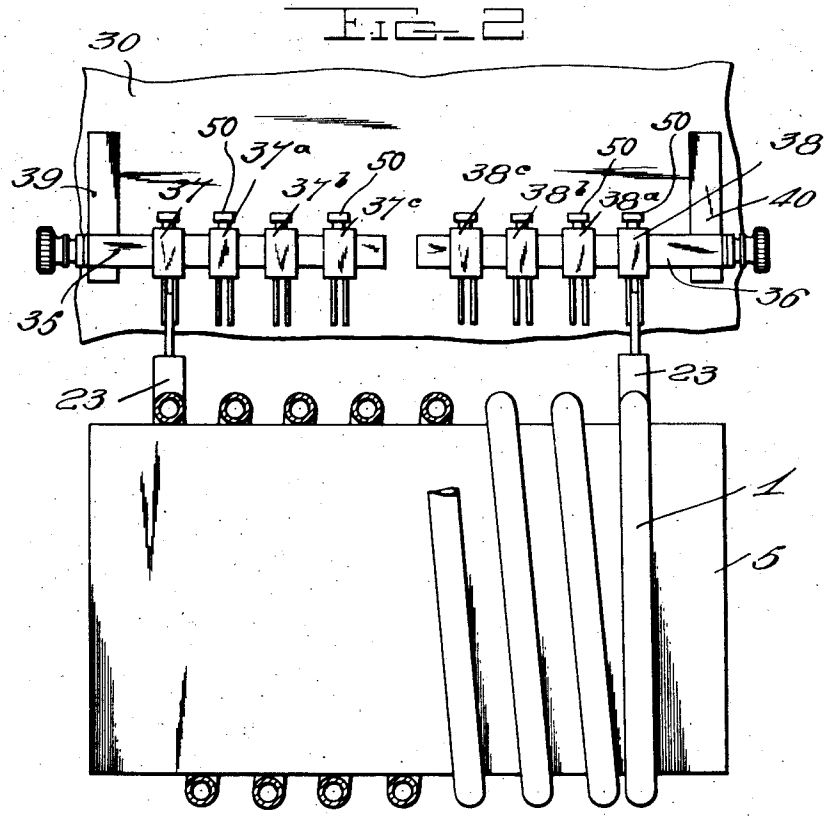
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INDUCTANCE SYSTEM

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FIG. 2



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INDUCTANCE SYSTEM

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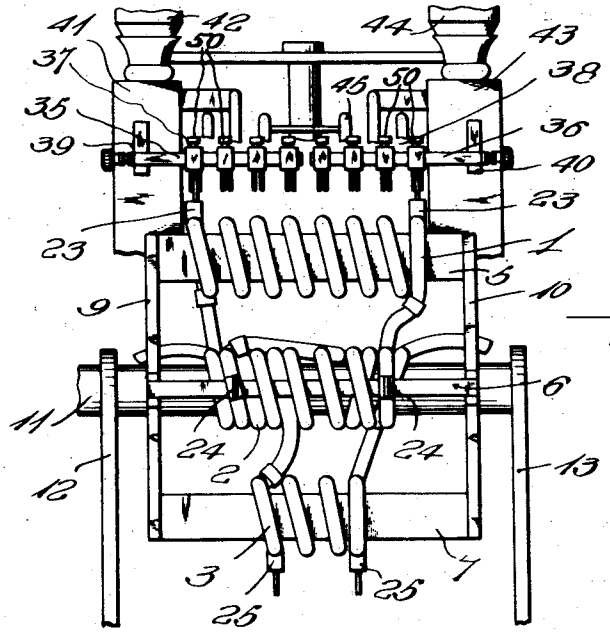


FIG. 3

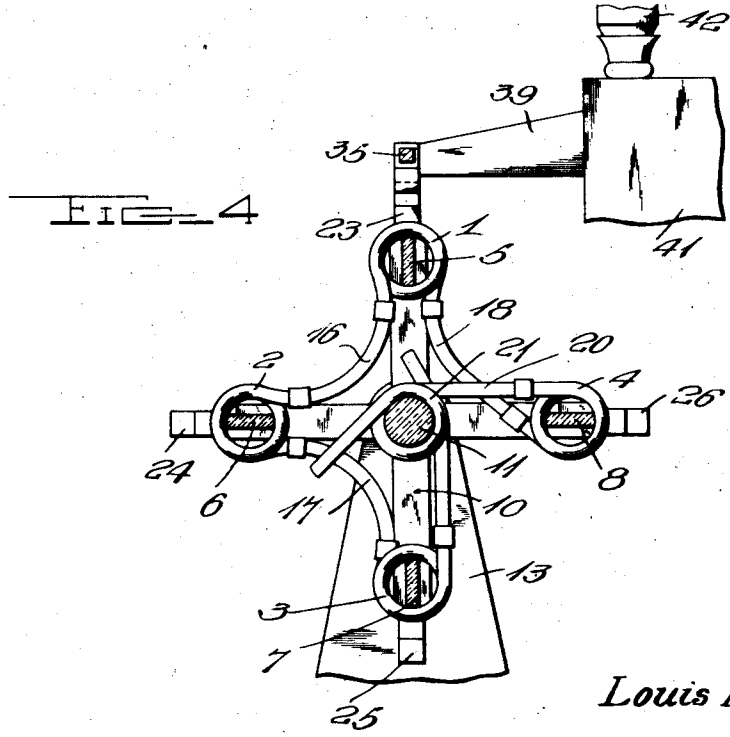


FIG. 4

Inventor

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Patented June 10, 1930 1,763,233

UNITED STATES PATENT OFFICE

LOUIS A. GEBHARD, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO WIRED RADIO, INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

INDUCTANCE SYSTEM

Application filed March 9, 1929. Serial No. 345,741.

My invention relates to inductance systems in general and more specifically to inductance systems employed in high frequency signaling.

An object of my invention is to provide an inductance system wherein the inductance is cooled by a circulatory liquid and whereby changes in the frequency characteristics may be easily and readily effected.

Another object of my invention is to provide an inductance system wherein a plurality of individual inductances cooled by a circulatory liquid may be selectively associated with external circuits.

Other and further objects of my invention are to provide certain structural features of the inductance system whereby the adaptability and efficiency of such systems are increased.

A better understanding of my invention can be had by referring to the specification following and to the accompanying drawings wherein:

Figure 1 is a perspective view of the inductance system of my invention; Fig. 2 shows a section of a modification of the inductance system of my invention; Fig. 3 shows a part section of a modified form of the inductance system; and Fig. 4 shows an end view in part section of the inductance system of my invention.

In high power transmitters employed in high frequency signaling systems it is necessary to provide some protection against excessive heating of the inductances. The area of the inductance member may be increased thus exposing greater radiating surface for the excessive temperature. This practice, however, is not satisfactory due to the increased capacity resulting from the increased area. A better solution of the problem is to provide metal tubing or tubing comprising alloys of metal wherethrough a cooling liquid is caused to circulate. Difficulty is experienced in attempting to provide an inductance system adaptable to a variety of circuits and a wide frequency band. The inductance system of my invention avoids the foregoing disadvantages and difficulties experienced with other systems.

Fig. 1 of the drawings is an illustration showing a perspective view of the inductance system of my invention. The inductance system in its entirety is mounted on a common base 14. A plurality of individual inductance coils are employed herein represented by inductance coils 1, 2, 3 and 4. Inductance coils 1, 2, 3 and 4 comprise suitable lengths of metal tubing or other members having a passage therethrough for the circulation of a liquid. Inductance coils 1, 2, 3 and 4 are supported by supporting coil forms or spacers 5, 6, 7 and 8 respectively. Spacers 5, 6, 7 and 8 are supported by star shaped end members 9 and 10. A common shaft 11 extends through and is positioned to members 9 and 10. Shaft 11 is supported by upstanding members 12 and 13, the latter provided with suitable bearings to permit the rotation of shaft 11. An indicating dial 15 is positioned to shaft 11 by means of which the particular coil connected to the external circuit may be ascertained.

Coils 1, 2, 3 and 4 are interconnected by members 16, 17 and 18. Members 16, 17 and 18 may comprise lengths of rubber tubing or other suitable insulating material. Such interconnecting of coils 1, 2, 3 and 4 provides a circulating system for a cooling medium which may not constitute an electrical interconnection. An electrical conducting material may be employed to advantage where the inductance connected in the circuit would be energized from a local source of electrical energy and the inductance not in use at the particular time serving as a high frequency choke coil. The circulation of the cooling fluid is continuous through coils 1, 2, 3 and 4 since the coils are connected in series arrangement for the circulation of the fluid. This arrangement serves to maintain coils 1, 2, 3 and 4 at substantially uniform temperatures irrespective of the particular coil connected to the high frequency circuit. A length of flexible tubing 20 is coiled around shaft 11 and connected to one end of coil 4. A length of flexible tubing 21 is coiled around shaft 11 and connected to coil 3. The cooling liquid is caused to circulate through flexible coil 20, metallic coil 4, conductor 18, coil 1, conductor 16, coil 2, conductor 17, coil 3

and out through flexible coil 21. The circulation may be in the reverse order or in any manner suitable.

Contact members 23, 24, 25 and 26 are positioned to inductance coils 1, 2, 3 and 4 respectively and revolve with the coils. Members 23, 24, 25 and 26 are positioned on inductance coils 1, 2, 3 and 4 respectively at the proper turns to give the various inductance values desired. Members 23, 24, 25 and 26 are adapted to engage with contact members 27 and 28 when coils 1, 2, 3 and 4 are rotated.

Fig. 1 of the drawings shows members 24 engaged with members 27. Inductance coil 2 is connected to the operating circuit at this adjustment. Indicating dial 15 indicates that coil 2 is in the circuit. Rotating shaft 11 through ninety degrees or one fourth circle, engages members 23 with members 27 and 27^a. Members 23 are positioned to coil 1 and indicating dial 15 would show that this coil is connected in the circuit. In like manner coils 3 and 4 may be rotated whereby their respective contact members are connected to the operating circuit. Any number of coils may be arranged to engage with the stationary contact members and each of the coils may be provided with as many contact members as are desired. Stationary contact members 27, 27^a and 28 are supported by an insulating member 29 and each may be provided with an adjustment screw 50 to secure the same in the required positions. Member 29 is supported by angle members from supporting member 30. The ends of the copper coils 1, 2, 3 and 4 may be provided with couplings for connecting the insulating tubing to the coils. The connections for fluid conduction between the coils may be made with the insulating tubing and the coils may be arranged so that the fluid paths are either in series or in parallel. The inlet and outlet fluid connections to the group of coils are made with insulating tubing 20 and 21 wound in the form of a coil around the shaft 11. Shaft 11 may be of insulating material. Sufficient tubing may be wound around the shaft to permit a high resistance path between the coils and ground where it is necessary for the coils to be at a high potential. This is the case where the coils are used in the output circuit of a thermionic tube and where a series feed system is used for the anode power supply.

Fig. 2 of the accompanying drawings shows in part a modification of the inductance system of my invention. Coil 1 of suitable metallic tubing is shown in part section. The several turns of coil 1 are wound on form 5 of suitable insulating material. The stationary contact members shown in Fig. 1 are shown in Fig. 2 herein supported by and movable on metallic rods 35 and 36. Rods 35 and 36 are insulated from each other. Members 39 and 40 support rods 35 and 36 respectively and are of suitable insulating material. This arrangement is especially adapted to balanced circuit arrangements and more particularly to amplifier circuits. Contact members 37, 37^a, 37^b and 37^c are positioned on rod 35. Contact members 38, 38^a, 38^b and 38^c are positioned on rod 36. Movable contact members 23 of coil 1 are shown engaged with contact members 37 and 38. Contact members 37^a, 37^b and 37^c and contact members 38^a, 38^b and 38^c are positioned to engage with contacts of coils 2, 3 and 4 shown in Figs. 3 and 4.

Figs. 3 and 4 show side and front elevations respectively of the inductance system of my invention. In Fig. 3 the arrangement is that adapted to balanced circuit arrangements wherein supporting members 39 and 40 are mounted on sockets 41 and 43, respectively. Sockets 41 and 43 retain thermionic tubes 42 and 44, respectively. A cooling liquid circulating through sockets 41 and 43 may also circulate through the several coils of the inductance system. Condenser 45 is positioned between sockets 41 and 43. In Fig. 4 a front elevation in part section is shown. Reference characters correspond to those of Fig. 3. The coils of insulating tubing and inductance coils are shown interconnected by tubing members 16, 17 and 18.

Many modifications of the inductance system of my invention are possible. The end turns of the coils of insulating tubing may be fastened to the shaft, a large loop of the hose permitting the shaft 11 to turn freely and maintaining a continuous fluid path through the hose at the same time. The end of the loop may be held by a clip which is supported from the main frame of the transmitter. The insulating tubing coils 20 and 21 may be wound in such a manner that their respective turns are side by side with both inlet and outlet to the system located at one end of the shaft.

I realize that many modifications are possible without departing from the spirit of my invention and it is to be understood that the embodiments of my invention are not to be limited by the foregoing specification or by the accompanying drawing but only by the limitations imposed by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. An inductance system comprising in combination a plurality of individual inductance coils, said inductance coils comprising lengths of metal tubing, said coils supported by a common framework, a shaft supporting and adapted to rotate said framework and individual lengths of insulating tubular members interconnecting said coils.

2. An inductance system comprising in

combination a plurality of individual inductance coils, said inductance coils comprising lengths of metal tubing, individual lengths of flexible fluid conducting members interconnecting said individual coils and means for rotating said inductance coils to selectively associate the same with an external circuit.

3. An inductance system comprising in combination a plurality of individual helical members, said members comprising metal tubing, insulated flexible tubing interconnecting said helical members and means for rotating said members to selectively associate the same with an external circuit.

4. An inductance system comprising in combination a plurality of individual helical members comprising lengths of metallic tubing having associated contact members, individual lengths of insulating tubing interconnecting said helical members and lengths of flexible tubing adapted to connect said helical members with a source of cooling liquid.

5. An inductance system comprising in combination a plurality of inductances mounted on a rotatable framework, said inductances consisting of metal tubing, insulating tubing interconnecting said inductances and flexible tubing adapted to associate said inductances with a source of liquid.

6. An inductance system comprising in combination a plurality of individual inductances mounted on a rotatable framework, said inductances comprising metallic tubing and insulating fluid conducting members interconnecting said inductances.

7. An inductance system comprising in combination a plurality of individual inductances adapted to be selectively associated with an external circuit, said inductances comprising individual tubular electrical conductors and fluid conducting members interconnecting said inductances.

8. An inductance system comprising in combination a plurality of individual inductances adapted to be selectively associated with an external circuit, said inductances comprising individual tubular electrical and fluid conducting members and interconnected by members adapted to convey fluid between said inductances and provide a relatively high electrical resistance between said inductances.

9. An inductance system comprising in combination a plurality of individual inductances adapted to be selectively associated with an electrical circuit, said inductances comprising individual tubular electrical and fluid conducting members and interconnected by individual fluid conducting members having a high electrical resistance.

10. An inductance system comprising in combination a plurality of individual inductances adapted to be selectively associated with an external circuit, said inductances comprising individual tubular electrical and fluid conducting members and interconnected by flexible fluid conducting members having a high electrical resistance.

LOUIS A. GEBHARD.