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ADJUSTABLE INDUCTANCE SYSTEM

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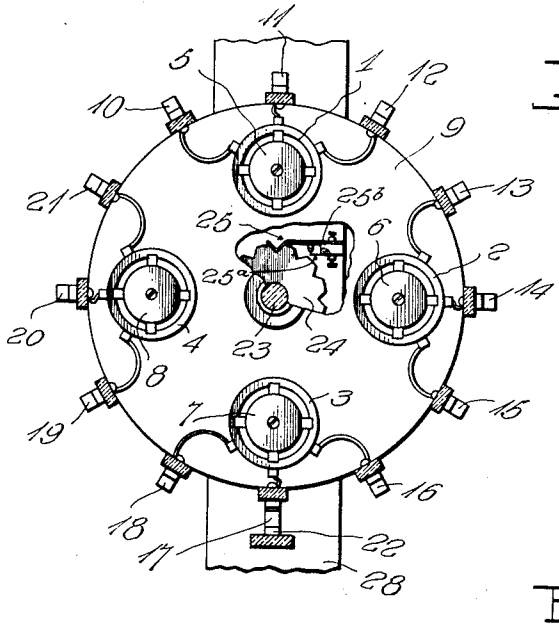


Fig. 1

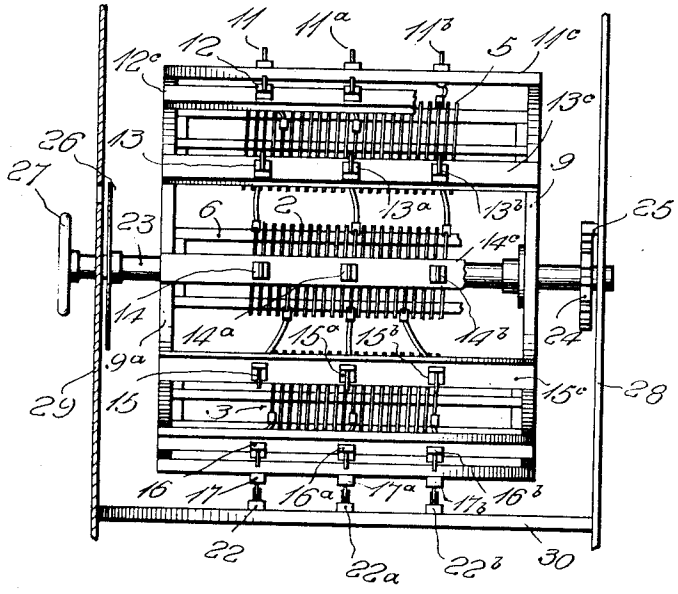


Fig. 2

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ADJUSTABLE INDUCTANCE SYSTEM

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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 adapted to include a wide range of inductance values either of which may be selectively employed at will.

Another object of my invention is to provide an inductance system whereby the inductance is varied at will in relatively small amounts.

Still another object of my invention is to provide an inductance system wherein the inductance associated with an external circuit may be varied in relatively small steps and wherein a wide range of inductance values are readily obtainable.

Other and further objects of my invention are to provide certain structural features whereby the inductance system is adaptable to wide application as more fully set forth in the specification following and illustrated in the accompanying drawing wherein:

Figure 1 shows an end elevation and Fig. 2 shows a side elevation of the adjustable inductance system of my invention.

It is frequently necessary or desirable to employ an adjustable inductance for high frequency transmitting systems, laboratory experimentation and other varied applications. In inductance systems designed to be employed in combination with high frequency electrical circuits it is necessary that the losses be reduced to a minimum. Losses arise most frequently in long connections to the inductance proper or through certain switching arrangements for effecting a variation in the amount of inductance connected to the external circuit. By external circuit is meant that circuit with which the inductance is to be employed, such as a thermionic tube, for instance. Losses in addition to the above mentioned are frequently present where a portion of a given inductance is connected to the external circuit and a large portion, that which is not immediately in use, having a magnetic field which is of no useful value at this adjustment. A better understanding of my invention can be had from the specification following and by referring to the accompanying drawing.

Fig. 1 of the accompanying drawing shows an end view of the adjustable inductance system of my invention. A plurality of individual inductance coils are arranged concentrically around a shaft and adapted to rotate therewith. The inductances are shown as four in number, however any number of coils may be employed. Inductance coils 1, 2, 3 and 4 are supported on a common circular frame member 9 and supported individually by coil forms or spacing members 5, 6, 7 and 8 respectively.

Members 5, 6, 7 and 8 are secured to frame member 9. Frame member 9 also supports contact members 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21. These contact members are directly supported by insulating members more fully illustrated in Fig. 2 to be referred to later in this specification. Stationary contacts 22 are provided adjacent to the above mentioned contact members and adapted to selectively engage therewith at the will of the attendant operator. Frame member 9 is supported by and secured to a shaft 23 which rests in suitable bearings provided in member 28. A section of member 9 is broken away to more clearly illustrate a "stop" or step by step ratchet mechanism which comprises a disk 24 having a notched periphery with which an arm 25 engages. Arm 25 has sufficient resilient properties to exert a retaining force against the movement of disk 24 which is secured to shaft 23. Disk 24 is secured to shaft 23 in such a manner that arm 25 engages with the notches in the periphery thereof corresponding to the position of the individual coils. Coils 1, 2, 3 and 4 are therefore held in the position set until voluntarily moved from this position by the act of the attendant operator. Contact members are carried by arm 25 adapted to contact with member 25*a*. The two contact members may be supported and electrically insulated from each other by a supporting block 25*b* of insulating material. In addition to the positive stop mechanism for retaining the respective coils in the proper position the contact members associated with and adjacent to arm 25

may control any electrical circuits. It is obvious that such circuits may include the energy supply circuits of thermionic tubes and the like whereby the potential is positively and immediately removed from the thermionic tube when a change of inductance is effected.

Fig. 2 is an illustration showing a side elevation of the adjustable inductance system of my invention. Reference characters herein correspond to those employed in Fig. 1. This illustration shows movable contact members 11*a*, 11*b*, 13*a*, 13*b*, 14*a*, 14*b*, 15*a*, 15*b*, 16*a*, 16*b* and 17*a*, 17*b* not shown in Fig. 1. These contact members are associated with the respective inductance coils in a manner suited to the particular application. In the illustration shown in Fig. 2, inductance coil 2 is supported on coil form 6, secured to frame member 9*a*. Form 6 is shown in section with that section removed which would normally be secured to frame member 9. Frame member 9*a* is similar to frame member 9 shown in Fig. 1 comprising a circular disk. It is obvious that members 9 and 9*a* may be of any suitable design such as crossed star shaped members. Insulating bars 13*c*, 14*c* and 15*c* are spacially positioned around the periphery of members 9 and 9*a* and substantially at right angles to their planes. Contact members 13, 13*a* and 13*b* are suitably spaced on insulating member 13*c* and are electrically connected to different portions of inductance 2. Contact members 14, 14*a* and 14*b* are spacially positioned on insulating member 14*c* and electrically connected to different portions of inductance 2 or other than those of members 13, 13*a* and 13*b*. In like manner contact members 15, 15*a* and 15*b* are spacially positioned on member 15*c* and electrically connected to different turns of inductance 2 other than the connections of members 13, 14, 13*a*, 13*b*, 14*a* and 14*b*. Contact members 13*a*, 14*a* and 15*a* are usually connected to substantially the same turn of inductance 2 when the inductance is employed in an oscillatory circuit arrangement, it is obvious, however that these connections may be in any manner to any portion of the inductance.

Similarly, contact members 16, 16*a*, 16*b*, 17, 17*a*, 17*b* and others are electrically associated with inductance coil 3. Each of the individual inductance coils are in this manner associated with individual contact members. In this manner it is possible to obtain a plurality of different inductance values from each of the individual inductance coils. A greater change in the inductance value to be connected to the external circuit is obtained when frame member 9—9*a* is moved sufficiently to bring a different inductance coil in position. An indicating dial 26 and control handle 27 are secured to shaft 23. Axle 23 is supported by members 28 and 29, the latter provided with suitable bearings through which shaft 23 rests. Stationary contacts 22, 22*a* and 22*b* are positioned in such a manner as to be engaged with the contact members carried by frame member 9—9*a*.

The operation and advantages of the adjustable inductance system of my invention may be understood by more detailed reference to Fig. 1. The position of the inductance coils shown in this illustration is that where inductance 3 is connected to the stationary contact members. This position is secured by locking mechanism 24—25. The retaining force of locking mechanism 24—25 may however be overcome and the inductance 3 moved either in a clockwise or anticlockwise direction. Either of the last mentioned positions would connect a different value of inductance to the stationary contact members. The number of groups of contacts associated with a particular coil may be greater than or less than the three groups shown. It is advantageous, however, to employ such connections to the respective turns of the inductance coil as would not leave a great number of unused turns or a large portion of the coil as a "dead end."

The "dead end" is herein employed as designating that portion of the inductance not immediately connected to the external circuit. It is therefore in accordance with efficient design that the number of different adjustments of inductance provided for a given inductance coil not be great enough to leave a large portion of the respective inductance out of the circuit. When an increase or a decrease in the amount of inductance is desired beyond the range of the particular coil in the circuit, another coil is moved into position. In this manner losses are reduced to a minimum.

I realize that many modifications of my invention are possible without departing from the spirit of my invention. The number of individual inductances or the design of the inductances as shown herein is not to limit my invention and it is to be further understood that the embodiments of my invention shall not be restricted by the foregoing specification or by the accompanying drawing but only by those restrictions imposed from the appended claims.

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

1. In an inductance system, a fixed frame, a rotatable frame supported by said fixed frame and comprising lateral members, a plurality of inductors carried by said rotatable frame, rotor contactors carried by said lateral members and in electrical relation with said inductors, and fixed contactors carried by said fixed frame and adapted to engage said rotor contactors as said rotatable frame is rotated.

2. In an inductance system, a fixed frame, a rotatable frame supported by said fixed frame and comprising lateral members, a plurality of inductors carried by said rotatable frame, rotor contactors carried by said lateral members and in electrical relation with said inductors, fixed contactors carried by said fixed frame and adapted to engage said rotor contactors as said rotatable frame is rotated, and locking means for exerting a retaining force against the movement of said rotating frame in predetermined positions thereof.

3. In an inductance system, a fixed frame, a rotatable frame supported by said fixed frame and comprising lateral members positioned substantially as elements of a cylinder, a plurality of inductors carried by said rotatable frame, rotor contactors carried by said lateral members and in electrical relation with said inductors, and fixed contactors carried by said fixed frame and adapted to engage said rotor contactors as said rotatable frame is rotated.

4. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, whereby electrical connection may be made selectively to each of said inductor units.

5. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, a ratchet wheel carried by said shaft, a resilient arm bearing upon said ratchet wheel and adapted to engage notches in the periphery of said ratchet wheel corresponding to positions in which said rib contact elements engage said fixed contact elements, whereby electrical connection may be made selectively to each of said inductor units.

6. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, and locking means for exerting a retaining force against the movement of said rotor unit when said rib contact elements engage said fixed contact elements, whereby electrical connection may be made selectively to each of said inductor units.

7. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements formed of metallic ribbon supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact

elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, whereby electrical connection may be made selectively to each of said inductor units.

8. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements formed of electrical conductor supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, whereby electrical connection may be made selectively to each of said inductor units.

9. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements having different values of inductance supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, whereby electrical connection may be made selectively to each of said inductor units.

10. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at separate points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, locking means for exerting a retaining force against the movement of said rotor unit when said rib contact elements engage said fixed contact elements, and switching means operably associated with said locking means, whereby electrical connection may be made selectively to each of said inductor units.

11. In an inductance system, a rotor unit comprising end supporting members and lateral rib members carried by said end members, a plurality of coil form members extending between and carried by said end members, a central supporting shaft, means for rotating said rotor unit, a plurality of helical single layer inductor elements supported respectively on said coil form members, rib contact elements carried by said lateral rib members and extending outwardly from the axis of said rotor element, a supporting base frame provided with bearings in which said central shaft is carried, fixed contact elements carried by said base frame, inductor contact elements attached to said inductor elements at terminal points thereof, means for connecting said inductor contact elements respectively to adjacent rib contact elements, said rib contact elements and fixed contact elements being positioned and adapted to be respectively engaged as said rotor unit is rotated, whereby electrical connection may be made selectively to each of said inductor units.

12. An interchangeable electrical circuit controlling instrument comprising, a plurality of electrical devices, a rotatable member upon which said devices are mounted contact posts electrically connected with said devices, said posts projecting from said rotatable member, said posts located upon the rotatable member in different planes and movable with said member in said different planes, a member rigidly positioned in spaced relation with the rotatable member, and contact plates located upon said rigid member and projecting therefrom into the path of movement of said posts for completing electrical circuits including either of said electrical devices.

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