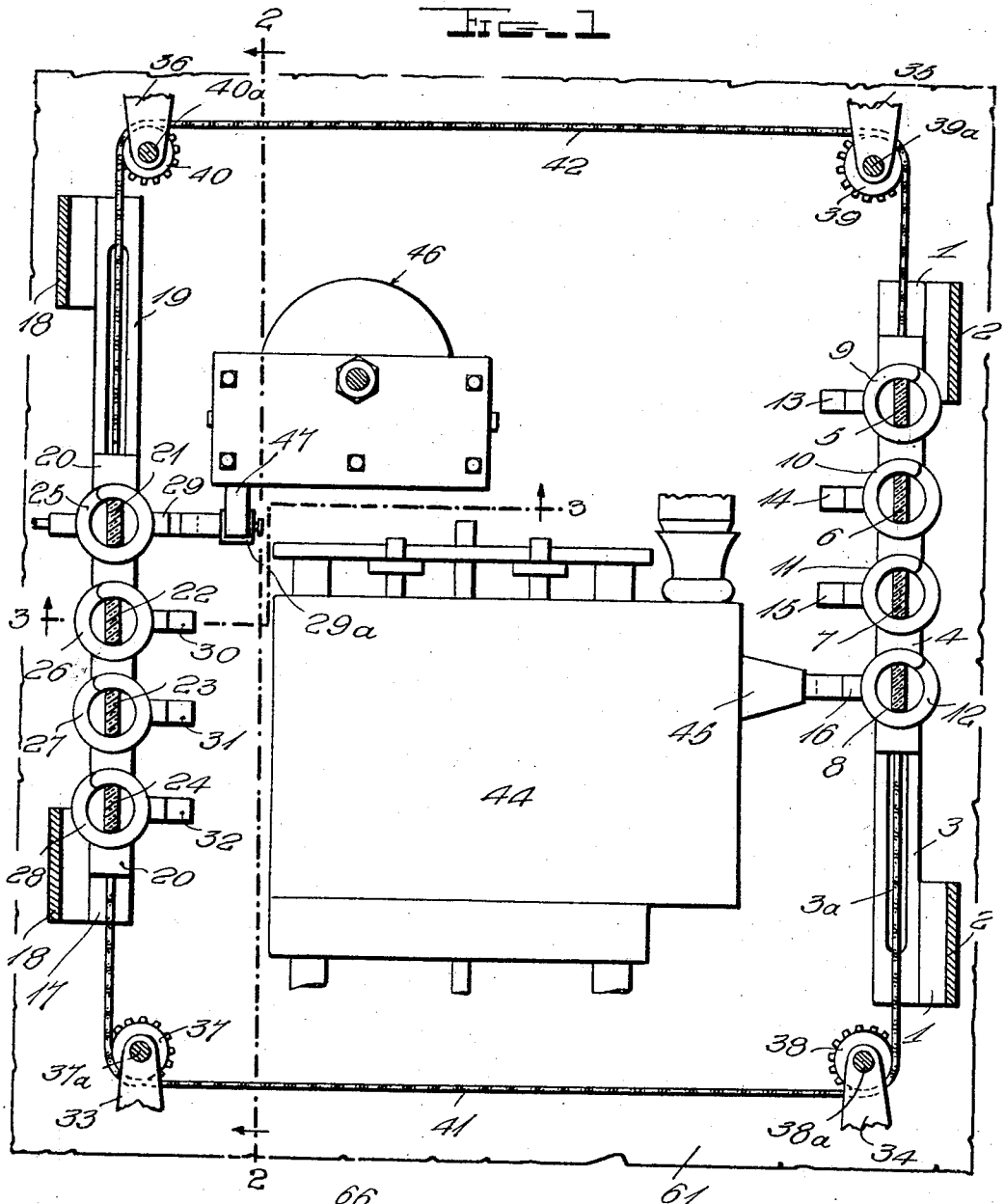
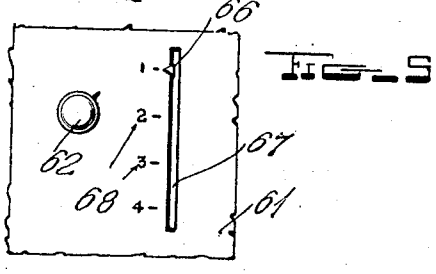
July 19, 1932. L. A. GEBHARD 1,867,820

INDUCTANCE CHANGING SYSTEM

Filed Oct. 16, 1929 3 Sheets-Sheet 1



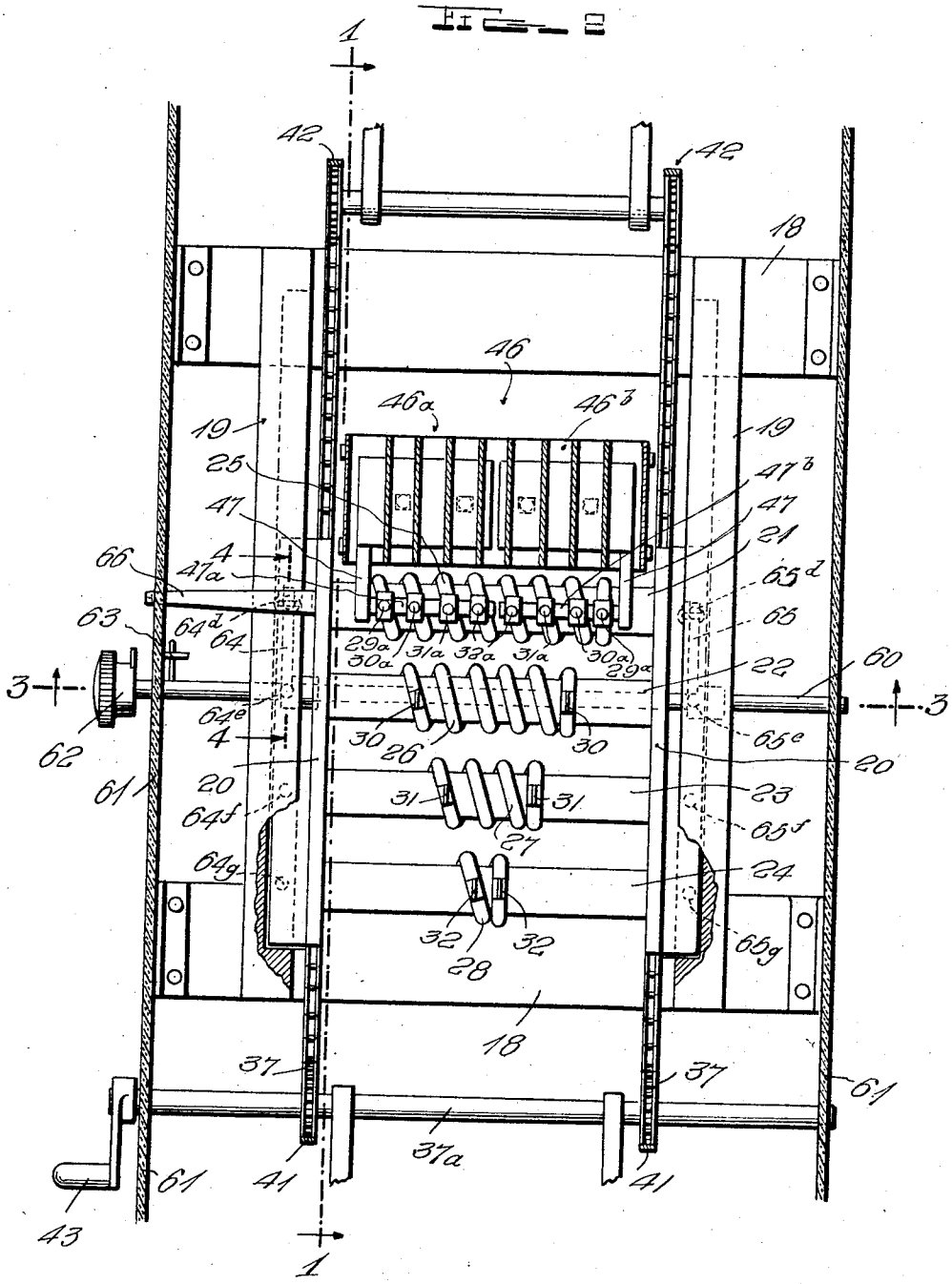


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INDUCTANCE CHANGING SYSTEM

Filed Oct. 16, 1929 3 Sheets-Sheet 2



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INDUCTANCE CHANGING SYSTEM

Filed Oct. 16, 1929 3 Sheets-Sheet 3

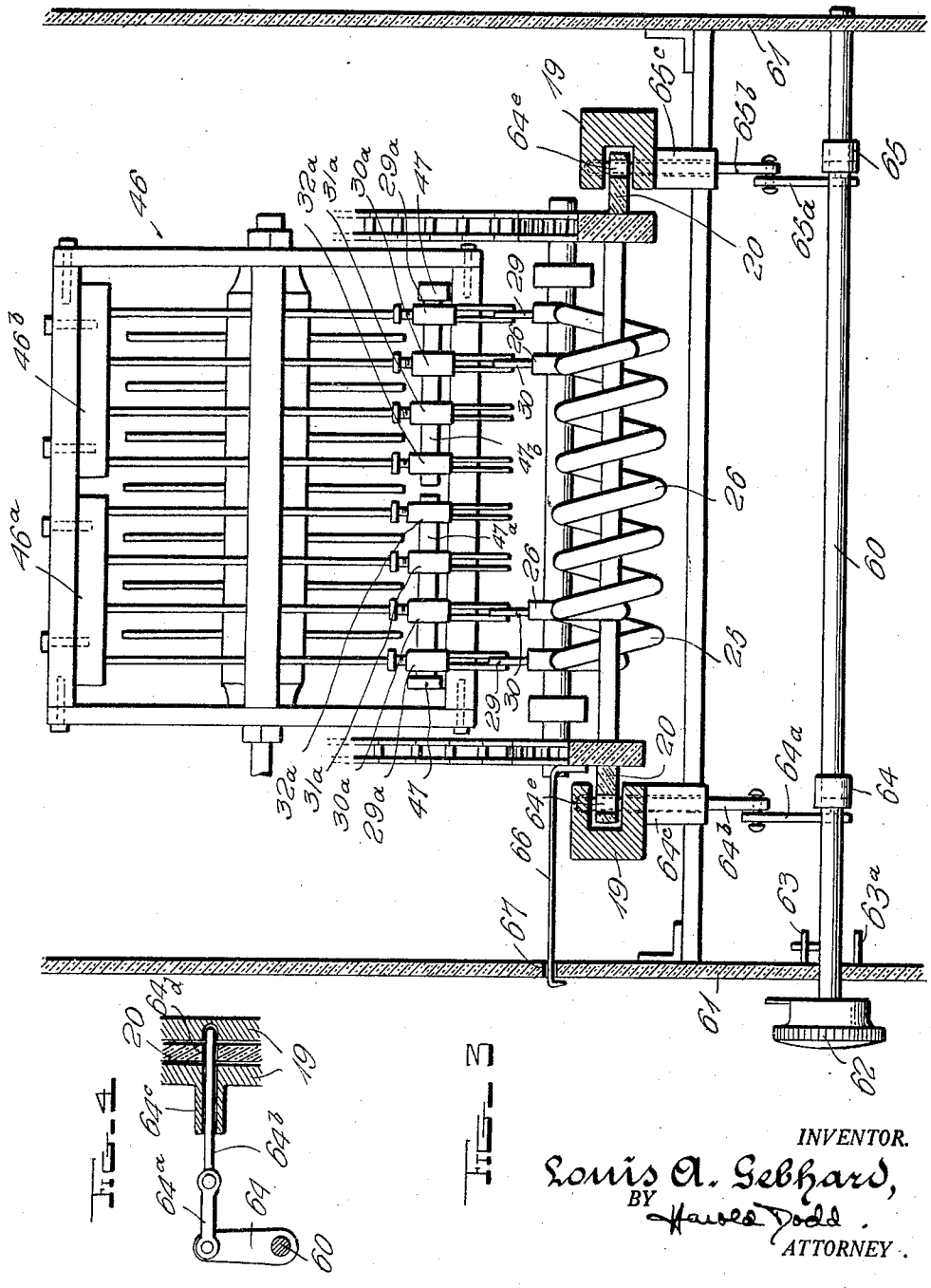


FIG. 4

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UNITED STATES PATENT OFFICE

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INDUCTANCE CHANGING SYSTEM

Application filed October 16, 1929. Serial No. 400,082.

My invention relates broadly to wave changing systems, and more specifically to a construction of inductance change switch for wave changing systems.

One of the objects of my invention is to provide an efficient construction of inductance change switch by means of which inductance units employed in a signaling system may be readily interchanged.

Another object of my invention is to provide an inductance unit arrangement in a wave change apparatus of a signaling system whereby the inductance units employed in various circuits of a signaling system may be simultaneously and readily selected and changed.

Still another object of my invention is to provide an inductance arrangement in a signaling system having means for controlling and selecting inductance units and rendering such units effective in the circuits of a signaling system through the operation of a single control.

A further object of my invention is to provide an inductance unit arrangement in a signaling system whereby selected ones of a plurality of inductance units may be connected into the circuits of a signaling system through minimum lengths of interconnecting conductors.

A still further object of my invention is to provide an inductance unit system for high powered signaling systems, wherein a plurality of inductance units are insulatingly supported in spaced relation upon a movable rack in a position to engage connectors supported by an adjacent frame for establishing connection with the circuits of the signaling system.

Other objects and features of this invention will be apparent to those skilled in the art to which this invention relates from the following specification by reference to the accompanying drawings in which:

Fig. 1 is a cross-sectional view taken through the wave changer structure of my invention on line 1—1 of Fig. 2 and showing the arrangement of parts and the means for effecting adjustment thereof; Fig. 2 is a cross-sectional view taken through the wave changer on line 2—2 of Fig. 1; Fig. 3 is a lateral cross-sectional view through the wave changer on line 3—3 of Figs. 1 and 2; Fig. 4 is a fragmentary view on line 4—4 of Fig. 2 illustrating the construction of locking means employed in the wave changer of my invention; and Fig. 5 shows a view of the front panel and indicator means by which the position of the wave changer apparatus may be determined from the front of the operating panel.

According to this invention an arrangement is provided whereby a plurality of inductance units are mounted upon laterally positioned members of insulating material on a movable rack. A stationary frame is provided adjacent the movable rack for supporting fixed contacts for engaging projecting contacts carried by the inductance units as the movable rack is moved past the stationary member. I provide means for locking the movable rack in any selected position in the course of the adjustment thereof to a selected setting.

The contacts carried by the stationary frame are connected with the circuits of an electron discharge device system which has variable electrostatic capacity units associated therewith, preferably in the manner illustrated in my copending application Serial No. 339,144 filed February 11, 1929 for condenser systems.

A second rack member having laterally extending members of insulating material associated therewith for supporting a plurality of inductance units of different inductance values is provided in the wave changer system of this invention. This second rack is movable simultaneously with the first rack through the action of interconnecting flexible members which operate over suitable guides. Sets of stationary contact members are positioned upon bars of conducting material adjacent a variable electrostatic capacity which is associated with the input circuit of the electron discharge device, the output circuit of which is connected to the inductance units associated with the first rack member. Connections are provided between sections of the variable capacity and sets of stationary con-

tact members. Selected ones of these contact members are engaged by contacts positioned upon the inductance units as the second rack member is moved past the stationary contacts.

The constants in the input and output circuits of a high power electron discharge device in a transmitter are thus varied simultaneously through the operation of the inductance moving mechanism. This system, for varying electrical constants of the input and output circuits of an electron discharge device, may be employed in a system in which several electron discharge devices are employed and where it is desired a single unit comprising two or more racks upon each of which a plurality of inductance units are mounted may be employed to control all of the circuits of the entire system.

Referring more particularly to the drawings, reference numeral 1 designates a frame member formed by transversely disposed members 2 and vertical members 3 which are provided with longitudinally extending slots 3*a*. A movable rack member having upright members 4 and laterally extending members 5, 6, 7 and 8 of insulating material, such as synthetic porcelain products, wax impregnated dried wood or the like, are slidably supported at their ends by the frame member 1. Inductance units 9, 10, 11 and 12 are mounted upon the laterally extending members 5, 6, 7 and 8 respectively. Sets of contacts 13, 14, 15 and 16 are positioned on the periphery of the outer end turns of the inductance units 9, 10, 11 and 12 respectively. Another frame member 19, similar to the frame 1, having transversely disposed members 18 similar to members 2 is provided for slidably supporting the rack 20. Laterally extending members 21, 22, 23 and 24 are provided on the rack 20. Inductance units 25, 26, 27 and 28 having contacts 29, 30, 31 and 32 mounted on the outer end turns thereof, respectively, are positioned upon the cross pieces 21, 22, 23, and 24, respectively. Flexible members 41 and 42, which may be in the form of a chain, belt or flexible twine cord are attached to the ends of the racks 4 and 20. The flexible members 41 and 42 are directed over small gear wheels or pulleys 37, 38, 39 and 40 which are journaled on the shafts 37*a*, 38*a*, 39*a*, 40*a* which are supported in position by the brackets 33, 34, 35 and 36.

A crank, knob, dial or similar means 43 is mounted on the shaft 37*a* for rotating the gear wheels 37 for moving the flexible members 41 and 42 and the inductance unit retaining racks 4 and 20. A stationary contact supporting unit 45 is supported upon a wall of the condenser and electron discharge device system 44 which is made in the manner illustrated in my copending application to which reference has been previously made. Another stationary contact supporting unit 47 is mounted upon the variable electrostatic capacity 46. Different ones of the inductance units associated with the racks 4 and 20 are connected into circuit with the electron discharge device and condenser system 44 and the variable electrostatic capacity 46 upon the actuation of the crank 43. Additional inductance supporting racks may be provided either above or below the racks 4 and 20 at convenient places along the flexible members 41 and 42 if it is desired to control the value of inductance employed in a greater number of circuits.

In Fig. 2 of the drawings, the manner in which the inductance units are mounted upon the rack and successively connected into circuit is more clearly illustrated. Bars 47*a* and 47*b* directed toward each other but insulated one from the other are positioned upon the supports 47. Sets of adjustable contact members 29*a*, 30*a*, 31*a* and 32*a* are positioned upon the bars 47*a* and 47*b* in spaced relation. Contacts 29 which are positioned upon the inductance 25 are caused to engage the contacts 29*a*; contacts 30 of inductance 26 engage contacts 30*a*; contacts 31 of inductance 27 engage contacts 31*a*; contacts 32 of inductance 28 engage contacts 32*a*; as the rack 20 is moved upward or downward.

Different inductance units are thus connected to the two sets of stationary plates 46*a* and 46*b* of the condenser 46. A shaft member 60 is journaled in frame 61 which encloses the wave changer apparatus and projects through the front panel from which it may be operated under control of knob 62 in angular movement limited by stops 63 and 63*a*. Shaft 60 carries laterally projecting arm members 64 and 65 which connect through links 64*a* and 65*a* with pins 64*b* and 65*b* which are projectible through sleeves 64*c* and 65*c* through aligned apertures in vertically extending guide members 19. The rack members 20 are each apertured as shown at 64*d*, 64*e*, 64*f*, 64*g* and 65*d*, 65*e* 65*f*, 65*g*, to receive the pins 64*b* and 65*b* when the rack 20 is brought into a position where a selected inductance registers with corresponding contact members to complete a circuit to the transmitter.

Fig. 4 shows the pin 64*b* projected to a position through frame 20 for securing the contacts 29 of inductance 25 in connection with contact members 29*a*. Where it is desired to shift the rack 20 to a higher position to register a different inductance with the fixed contact members, shaft 26 is rotated to withdraw pins 64*b* and 65*b* from position, the rack is shifted and the pins restored to position for locking the rack in position at the selected setting. The frame 20 carries an indicator 66 thereon which projects through a slotted portion 67 of panel 61 and moves adjacent a series of calibrations 68 on panel 61 for indicating to the operator the

condition of the adjustment of the wave changer.

The extremely short leads required between the condenser system and electron tube circuits in the transmitter of my invention permit of a high degree of efficiency in the operation of short wave transmitters.

While I have described my invention in certain of its preferred embodiments it is understood that various modifications thereof may be made without departing from the scope and spirit thereof and that I do not intend my invention to be limited to the exact details as set forth in the foregoing specification except in so far as these details are defined by the appended claims.

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

1. In inductance systems of the class described the combination of a ladder-like rack member, a plurality of inductance units carried by laterally extending portions of said rack member, flexible members operatively attached to said rack for moving said rack and said inductance units in a vertical plane, and stationary contacts supported adjacent to said rack, and contacts positioned upon said inductance units for engagement with said stationary contacts.

2. In inductance systems of the class described the combination of a ladder-like rack, means for moving said rack through predetermined distances in a vertical plane, a plurality of inductance units mounted one above the other upon laterally extending portions of said ladder-like rack, a plurality of fixed contacts adjacent said rack, a stationary member for supporting said fixed contacts adjacent to said rack, and means positioned upon each of said inductance units for engaging selected ones of said fixed contacts as said rack is moved vertically past said stationary member.

3. In inductance systems of the class described the combination of a vertically movable member, a plurality of inductance units having co-planar axes supported one above another by said member, a stationary member for supporting a plurality of contacts, means associated with each of said inductance units for engaging selected ones of said contacts, and means for moving said first mentioned member in a vertical plane with respect to said second mentioned member.

4. In inductance systems of the class described the combination of a pair of movable frames, a plurality of inductance units mounted on each of said frames, means for displacing said movable frames in opposite directions, said inductance units being displaced through the same distances as said frames are simultaneously displaced, a stationary member positioned adjacent to each of said frames a plurality of fixed contacts carried by said stationary member, and movable contacts carried by said inductance units in alignment with said fixed contacts and adapted to selectively engage said fixed contacts as said frames are shifted in opposite directions.

5. In an arrangement of the class described the combination of a pair of frame members, a plurality of sets of inductance units, contacts on each of said inductance units, said inductance units being supported by said frame members, means for simultaneously displacing said frame members through a predetermined distance in parallel vertical planes, and stationary contacts adjacent each of said frame members in the path of the contacts on said inductance units for connecting different ones of said inductance units, and means for engaging and actuating said last mentioned means.

6. A wave changer apparatus comprising a multiplicity of frame members, individual helical inductance units carried by said frame members, guide means for each of said frame members, means interconnecting said frame members and imparting simultaneous movement thereto, connectors carried by said inductance units, a multiplicity of stationary contact members registrable with said connectors, and means for imparting movement to said means interconnecting said frame members for shifting said inductance units into connection with selected contact members.

7. A wave changer system comprising a pair of movable frame structures, individual inductance units carried by each of said movable frame structures and positioned with their axes co-planar, contacts positioned on said inductance units, a multiplicity of fixed contacts disposed intermediate said frame structures, means for shifting selected inductance units on each of said frame structures into connection with said fixed contacts, and locking means for maintaining selected inductance units in connection with said fixed contacts.

8. In a wave changer system, a slidable rack member, a multiplicity of inductance units of varying inductance values carried by said slidable rack, contact members carried by each of said inductance units, a set of stationary contact members aligned with the contact members on said inductance units, means for shifting said slidable rack to a position for individually connecting said contact members on selected inductance units with said stationary contact members, and means for locking a selected inductance unit in contact with said stationary contact members.

9. In a wave changer system, a slidable rack member, a multiplicity of inductance units of varying inductance values carried by said slidable rack, contact members car-

ried by each of said inductance units, a set of stationary contact members aligned with the contact members on said inductance units, means for shifting said slidable rack to a position for individually connecting said contact members on selected inductance units with said stationary contact members, and a laterally shiftable pin projectible through said slidable rack for locking said rack in a selected position for maintaining connection between the contact members on a selected one of said inductance units and said stationary contact members.

10. In a wave changer system, a slidable rack member, a multiplicity of inductance units of varying inductance values carried by said slidable rack, contact members carried by each of said inductance units, a set of stationary contact members aligned with the contact members on said inductance units, means for shifting said slidable rack to a position for individually connecting the contact members on selected inductance units with the stationary contact members, an angularly movable shaft member extending adjacent said slidable rack, pin members controlled by said angularly movable shaft member and projectible through said slidable rack for maintaining said slidable rack in locked position for connecting the contact members of a selected inductance unit with said stationary contact members.

11. In a wave changer system, a slidable rack member, a multiplicity of inductance units of varying inductance values carried by said slidable rack, contact members carried by each of said inductance units, a set of stationary contact members aligned with the contact members on said inductance units, means for shifting said slidable rack to a position for individually connecting said contact members on selected inductance units with said stationary contact members, a shaft member journaled adjacent said slidable rack for limited angular movement, pin members controlled by said shaft member, said pin members being projectible through said slidable rack for fixing the position of said rack and maintaining the contact members on a selected inductance unit in contact with said stationary contact members.

12. An inductance system comprising a pair of movable frame members, a plurality of inductance units carried by each of said movable frame members, flexible members interconnecting the ends of said movable frame members, means for engaging said flexible members for displacing said movable frame members in opposite directions in parallel planes, contacts on said inductance units, stationary contacts adjacent said frame members in alignment with the contacts on said inductance units, and means for shifting said flexible members for selectively engaging the contacts on said inductance units with said stationary contacts.

13. An inductance system comprising a frame structure, a pair of rotatable shaft members journaled in substantially the same horizontal plane adjacent the upper portion of said frame structure, a separate pair of rotatable shaft members journaled in a substantially horizontal plane adjacent the lower portion of said frame structure, sprockets carried by each of said shaft members, and disposed adjacent opposite sides of said frame structure in vertical parallel planes, track members disposed between the vertically aligned sprockets, racks vertically movable in said track members, chains interconnecting opposite ends of said racks and extending over said sprockets, separate inductance devices carried by each of said rack, contacts projecting from said inductance devices, sets of fixed contacts disposed in the path of the aforesaid contacts, and means for driving one of said rotatable shaft members for imparting movement to said sprockets and shifting said rack members step by step in opposite directions for selectively engaging predetermined contacts on said inductance devices with said fixed contacts.

LOUIS A. GEBHARD.