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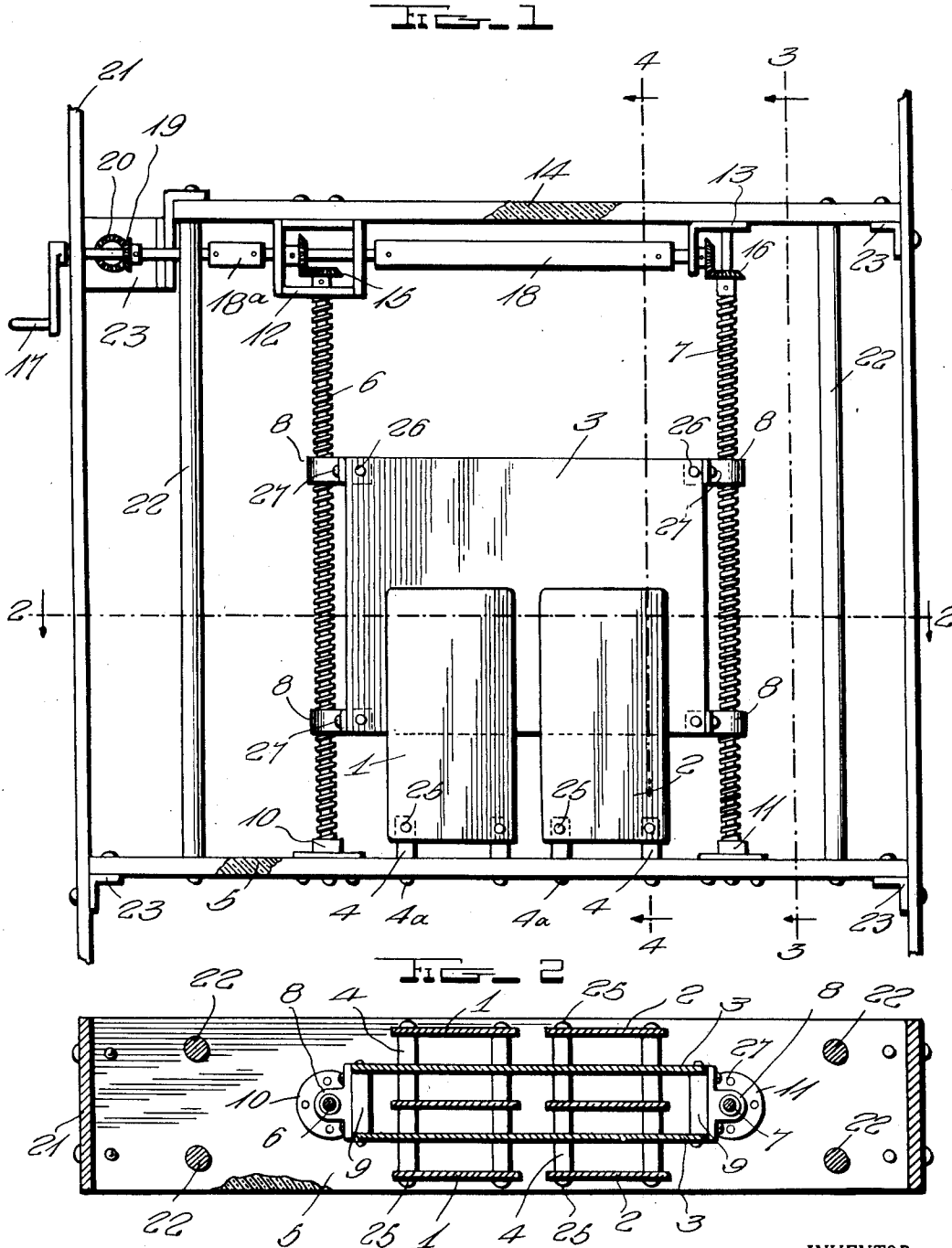
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VARIABLE AIR CONDENSER

Filed Dec. 24, 1930

2 Sheets-Sheet 1



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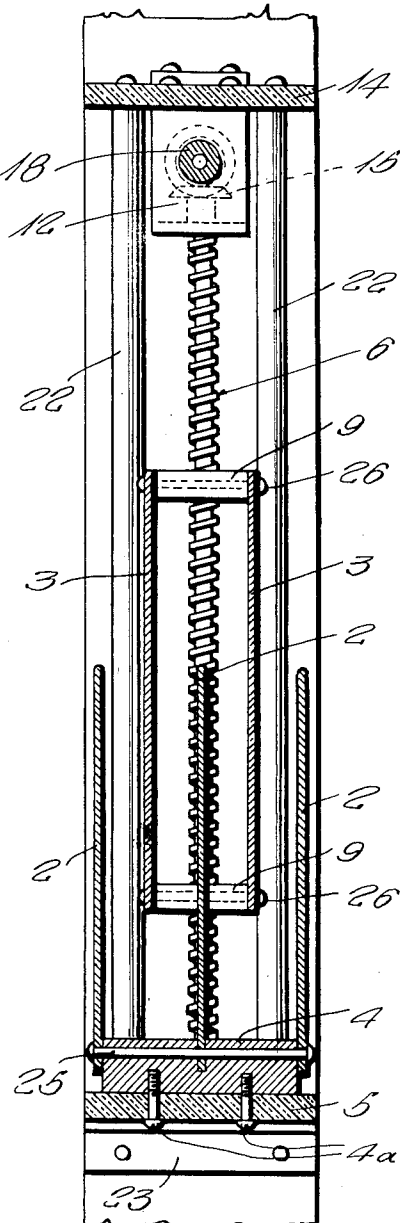
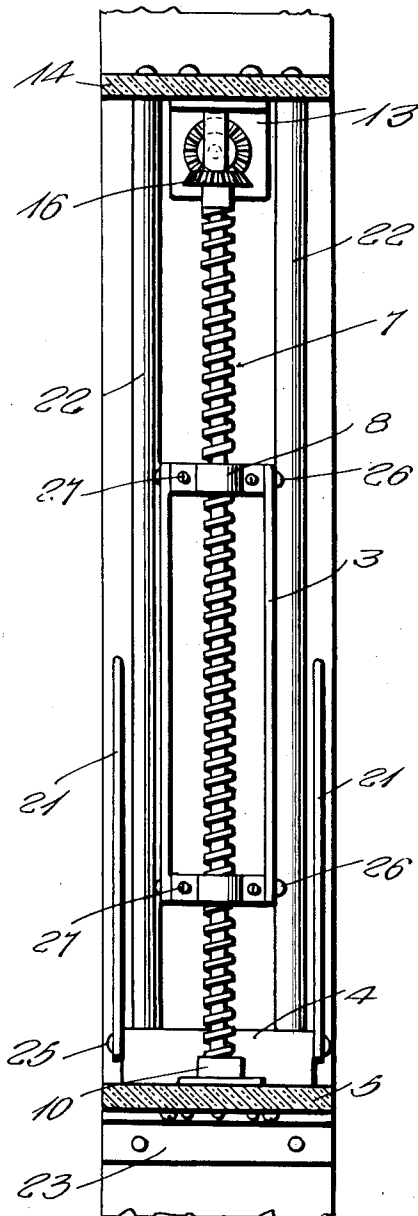
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Fig. 3

Fig. 4



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UNITED STATES PATENT OFFICE

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VARIABLE AIR CONDENSER

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Application December 24, 1930, Serial No. 504,626

10 Claims. (Cl. 175—41.5)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

My invention relates broadly to high frequency signaling systems and more particularly to an improved construction of variable air condenser for high frequency signaling systems.

In a high frequency transmitter covering a wide frequency band, it is desirable to have the frequency controlled by variable condensers which have a large ratio of minimum to maximum capacity. This condition is required in order that the widest possible frequency band may be covered. In high power circuits the push-pull tube arrangement is generally used. This requires symmetry of all parts of the circuit and therefore of the variable condensers used. It is also desirable where the condenser is used in circuits of very high frequency to have the capacity between high potential points of the condenser and ground of minimum value. It is desirable, therefore, to arrange the condenser so that the controls, etc., which have fairly large capacity will be at substantially ground potential.

My invention has for its object the construction of a high frequency condenser for transmitters utilizing a push-pull power amplifier system by which symmetry may be maintained throughout the adjustment of the condenser over a wide frequency band where the condenser has a large ratio of maximum to minimum capacity.

Another object of my invention is to provide means for supporting a multiplicity of fixed plates in a symmetrical condenser system with respect to a set of adjustable plates with a single control for adjusting the capacity of different portions of the condenser system simultaneously, the arrangement of plates being such that a minimum capacity exists between the points of high potential in the condenser and the ground.

Other and further objects of my invention reside in the construction of a symmetrical condenser system as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, wherein:

Figure 1 is a side elevation of the condenser system of my invention; Fig. 2 is a cross-sectional view through the condenser on line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view of the condenser on line 3—3 of Fig. 1; and Fig. 4 is a vertical sectional view through the condenser on line 4—4 of Fig. 1.

The high potential plates of the condenser are arranged in two banks 1 and 2 with plates in the respective banks set edge to edge and parallel. Into the space between these stationary plates the movable group plates 3 are introduced. Groups 1 and 2 are supported by means of spacers 4 from insulating member 5. Movable group of plates 3 is supported from threaded rods 6 and 7 by means of screw threaded members 8.

Screw threaded members 8 are attached to spacers 9 which serve to hold the plates of the group 3 apart. Threaded rods 6 and 7 are supported in bearings 10 and 11 which are in turn mounted on insulating member 5. The upper ends of the threaded rods 6 and 7 are supported in bearings 12 and 13 which are in turn supported from insulating member 14. Bevel gears 15 and 16 provide simultaneous control by crank 17 through flexible couplings 18 and 18a of the two threaded rods 6 and 7. Bevel gears 19 and counter 20 which is visible from the front panel 21 of the transmitter permit resetting the condenser to any particular point. Insulating members 5 and 14 are held together by means of supports 22 so as to form a rigid frame work for the condenser which is supported from the frame work of the set as shown at 23.

The sets of high potential plates 1 and 2 are illustrated as three in number in the arrangement shown in the drawings, however, additional plates may be employed. The spacer members 4 serve to maintain the plates in a vertical plane. The sets of stationary plates 1 and 2 have the individual plate members thereof electrically interconnected by the rod or bolt members 25 which pass through the spacer members 4 and are bonded to the plates. The members 4 are rigidly secured to the laterally extending insulating frame member 5 by screw members 4a. The central plate (or plates) is bonded to the interconnecting members 25 forming an extension of the capacity areas established by the outer plates of the sets of plates 1 and 2.

The spacers 9 which maintain the spacial relation of the adjustable plates 3 have bolt members 26 extending therethrough which, with the spacers 9, serve to electrically bond and mechanically embrace the adjustable plates as a unit. The screw threaded lugs 8 which are engaged by the screws 6 and 7 are rigidly connected to the spacer members 9 by screw members 27 which pass into the spacers. The movable plates 3 are adjusted vertically with respect to the sets of stationary plates 1 and 2 to a position which is symmetrical with respect to each portion of the amplifier circuit with which the high potential condenser is designed to cooperate. The control and parts connected thereto which have a fairly large capacity, are substantially at ground potential. A large ratio of maximum to minimum capacity is obtainable by reason of the wide variation in the spacing relation of the condenser plates which it is possible to obtain.

While I have described the high potential condenser of my invention in certain preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon.

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

1. A variable air condenser comprising an insulated frame structure, independent sets of condenser plates erected in vertical planes upon said insulated frame structure, a pair of rotatable screws disposed on opposite sides of said vertically disposed condenser plates, a set of adjustable plates, a pair of members respectively engaging said rotatable screws and respectively attached to each of said adjustable plates at points thereof substantially spaced apart, and means for selecting the position of said adjustable plates with respect to said sets of condenser plates.

2. A variable air condenser comprising a laterally extending insulated frame structure, duplicate sets of condenser plates disposed in vertical planes, means extending from said insulating frame structure and secured to the lower extremities of said condenser plates for erecting and maintaining said plates in vertical planes, a pair of rotatable screws disposed adjacent the remote edges of each of said sets of plates, a set of adjustable plates, means including a plurality of threaded lugs supportingly attached to said adjustable plates for adjustment thereof in cooperation with said screws and means for actuating said screws, for shifting the position of said adjustable plates with respect to said first mentioned sets of condenser plates for changing the electrical capacity with respect to said duplicate sets of condenser plates in equal amounts.

3. In a variable air condenser, a frame structure comprising a pair of laterally extending frame members of insulating material, a pair of rotatable screw threaded shafts extending vertically between said laterally extending frame members, independent sets of condenser plates erected vertically upon one of said frame members and disposed between said rotatable shafts, a set of adjustable plates, screw threaded members connected with the ends of said adjustable plates at points thereof spaced substantially apart and engaging said rotatable screw threaded members, and means for rotatably driving said screw threaded shaft members for variably interleaving said adjustable plates with said independent sets of vertically erected plates.

4. In a variable air condenser, a frame structure comprising a pair of insulation members, a pair of screw threaded rotatable shafts extending between and journaled with respect to said pair of insulation members, a plurality of threaded lugs engaging said rotatable screw threaded shafts, a set of adjustable condenser plates, mounted on said threaded lugs independent sets of fixed condenser plates supported by one of said insulation members, and means adjacent the other of said insulation members for imparting rotatable movement to said pair of rotatable shaft members for variably shifting the position of said adjustable plates with respect to said fixed plates.

5. A variable air condenser comprising a frame structure, independent sets of condenser plates supported by said frame structure and disposed in predetermined spaced relation, a pair of screw threaded rotatable shaft members symmetrically positioned with respect to said independent sets of condenser plates, a set of adjustable condenser

plates extending between said shaft members, screw threaded members attached to each of said adjustable condenser plates at, at least, two spaced points on opposite edges thereof and engaging said rotatable shaft members for maintaining said set of adjustable plates in a balanced bridged relationship between said rotatable shaft members interleaved with said sets of independent condenser plates.

6. A variable condenser comprising a frame structure, independent sets of condenser plates supported from one end thereof by a portion of said frame structure, a pair of rotatable screw threaded shafts supported by said frame structure, a set of adjustable plates supported in bridged relation between said pair of rotatable shafts and disposed in interleaved relation with respect to said independent sets of condenser plates, means extending from the ends of said adjustable condenser plates at points substantially spaced apart and engaging the screw threads on said rotatable shafts, and means for imparting equal rotatable movements to said shafts for shifting the position of said set of adjustable plates rectilinearly and in proportionate relation to each said independent set of condenser plates.

7. A variable air condenser comprising in combination, a frame structure, a plurality of independent sets of stator plates, the sets being insulated from one another and from said frame structure by which they are supported, a set of adjustable plates adapted to be interleaved with said stator plates, and means including a plurality of screw driven lugs attached to said adjustable plates for adjustably positioning the same whereby the capacitive relation of said adjustable plates to each set of stator plates is proportionately varied.

8. A device in accordance with claim 7, in which said adjustable plates are movable in a rectilinear direction and corresponding plates of the stator sets are arranged to be interleaved by each single adjustable plate.

9. In a variable air condenser, a frame structure comprising laterally extending insulation members, a plurality of sets of stator plate members supported by one of said insulation members, means electrically and mechanically bonding together the stator plate members of each said set as an independent capacity unit, a set of adjustable plates electrostatically common to the several sets of stator plate members, and means for shifting the position of said adjustable plates rectilinearly in respect to said stator plate members for varying the capacity relation to each set thereof proportionately.

10. In a variable air condenser, a frame structure comprising laterally extending insulation members and transversely extending plate supporting members, independent sets of stator plates held by said transversely extending members, the plates of each set being electrically bonded together thereby, a pair of rotatable screw threaded shafts carried by said laterally extending insulation members, a plurality of screw threaded lugs engaging said shafts, and a set of adjustable condenser plates supported by said screw threaded lugs and adapted to be variably interleaved with said independent sets of stator plate members, the adjustment thereof being provided by rotative movement of said screw threaded shafts.

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