April 10, 1928. 1,665,616

E. H. TRUMP

ELECTRICAL CONDENSER

Filed Oct. 17, 1924 2 Sheets-Sheet 1

Fig. 1

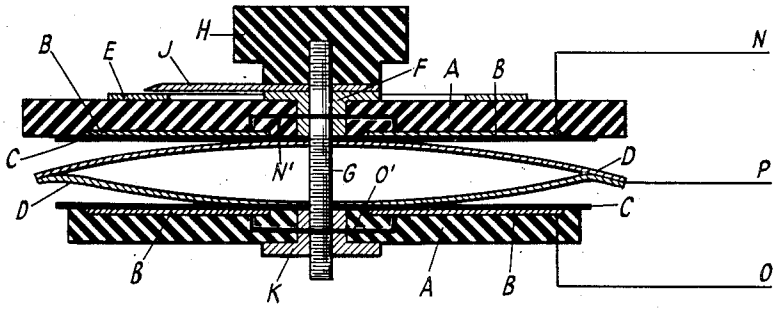

Fig. 2

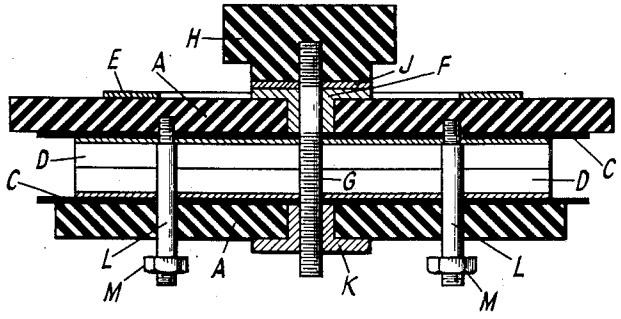

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Fig. 3

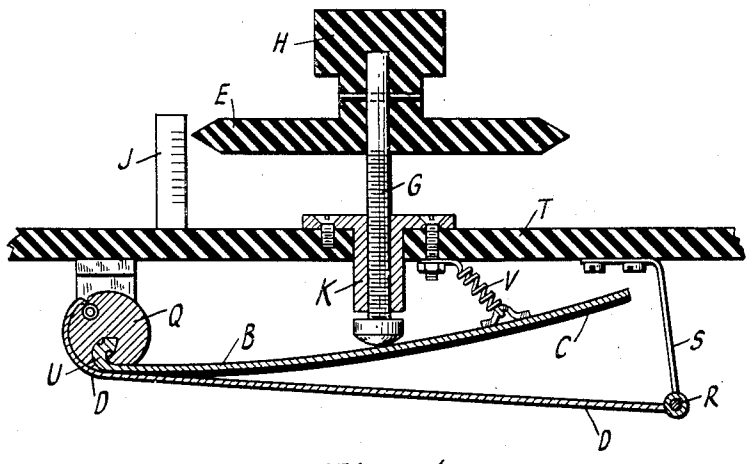
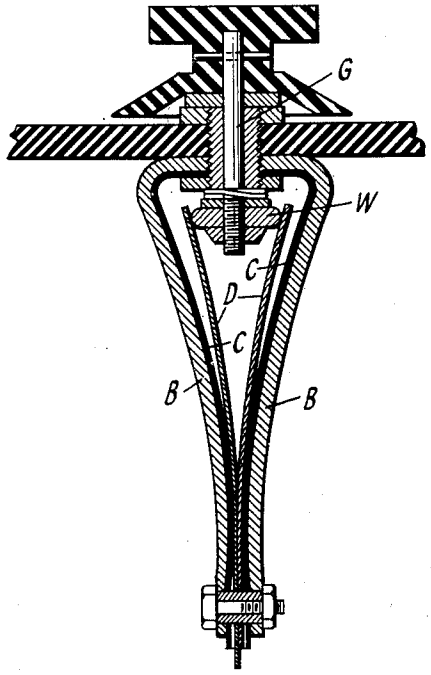


Fig. 4



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UNITED STATES PATENT OFFICE.

EDWARD HERBERT TRUMP, OF MERTON PARK, LONDON, ENGLAND, ASSIGNOR TO RADIO CORPORATION OF AMERICA, A CORPORATION OF DELAWARE.

ELECTRICAL CONDENSER.

Application filed October 17, 1924, Serial No. 744,099, and in Great Britain October 26, 1923.

This invention relates to electrical condensers and has for its object to provide an inexpensive variable condenser.

According to this invention I construct a variable condenser of two plates, one of which is rigid or stiff and the other yielding or flexible and preferably also resilient. The plates are separated by a sheet of dielectric, and means are provided for bending the yielding plate so as to vary the distance between the two plates. One of the plates may be rigid and flat and the flexible plate secured along one edge to the rigid plate or to the frame in which it is held, a sheet of dielectric being interposed between the two plates. Or the rigid plate may be curved in the form of part of a cylinder and the sheet of dielectric may be mounted thereon, while the flexible plate is naturally flat and is mounted with its middle portion in contact with the sheet, so that by applying pressure to the outside edges of the flexible plate it may be bent so that its two halves approach the curved plate. Again, two flat plates may be mounted in rigid frames parallel to one another and two curved flexible plates may be mounted between the two frames, which latter may be connected by a screw, so that by turning the screw the distance between the two frames can be varied and therefore the distance between the flexible plates and the rigid plates can be varied.

In order to provide a condenser having two elements which may be connected in series or in parallel, I may secure to each of the adjacent faces of two parallel frames two plates which lie in the same plane and are separated by insulating material. The frames are connected together by a screw and nut. Between the two frames are two flexible plates which touch one another along their outer edges so that by turning the screw in one direction or the other the frames may be made to approach or recede from one another, and the flexible plates may thus be bent, so varying the capacity.

My invention is illustrated by the accompanying drawing, which shows various forms of condenser constructed in accordance therewith. Figure 1 is a section through one form, Figure 2 being a section at right angles to Figure 1, this form having elements which may be connected in series or in parallel.

A, A, are two insulating frames arranged parallel to one another. To the adjacent faces of each frame are rigidly secured conducting plates B and to these are cemented sheets C of dielectric. Between the sheets C are two flexible resilient conducting plates D, D, in metallic contact with one another. The upper frame A carries a scale E and a bush F, the latter serving as a bearing for the actuating screw G. To the upper end of this screw is secured a handle H and a pointer J reading on the scale E. The lower end of the screw screws into a threaded bush K fixed to the lower frame which is prevented from rotating by pins L screwed into the upper frame and fitted with nuts M on their lower ends to limit the movement of the lower frame A. The two plates B in the upper frame are connected together by lead N′ and to a lead N while the two plates B in the lower frame are connected together by lead O′ and to a lead O, while the plates D are connected to a lead P. It will be understood that by turning the handle H the distance between the frames can be varied, and, and as the lower frame is moved towards the upper frame the plates D, D, will be flattened, thus lessening the distance between them and the plates B, and so the capacity between these plates will be varied.

If the leads N and O are connected together the maximum capacity of the condenser may be obtained, but if, on the other hand, the leads N and O are used, P being left disconnected, all the values of the condenser will be reduced to one quarter of their full value.

The law of the condenser or the relation between the settings on the scale and the corresponding capacities of the condenser can be varied by giving different initial curvatures to the plates D. If these plates are bent into an arc of a circle, they will come down on the dielectric almost over their whole length at once. In this case the greater part of the variation of capacity of the condenser will take place in a small angle on the scale near the maximum reading. If this effect should be desirable it can easily be accentuated by curving the spring plates more in the middle than at the ends, but more usually this is not desired, and can be overcome to a large extent by making the spring plates flatter in the middle and more curved at the ends. When this is done the screwing together of the two frames causes

the plates D to flatten themselves slowly from the centre outwards against the dielectric, so that when the pointer on the scale indicates one half of its full movement, a little less than half of each rigid plate should be covered by its corresponding spring plate. If a very small minimum be desired, this can be obtained by increasing the spacing between the two rigid plates in each frame.

Figure 3 is a section through another form in which there is a single rigid conducting plate B covered with a layer of dielectric C and having a cylinder Q of insulating substance moulded round and firmly fixed to one end. In this cylinder is cut a slot which serves to hold one end of the flexible conducting plate D, the other end of which is stiffened by a metal rod R held out by springs S secured to the panel T. An internally threaded bush K is mounted in this panel and through it passes the actuating screw G provided with a handle H on which is a circular scale E which can be read against a fixed pointer J. The cylinder Q is supported on pivots U. Thus as the handle H is turned the screw G will be moved through the nut K and its end bearing upon the plate B will cause the latter to turn about the pivots U and so to press itself against the flexible plate D which will cause the latter to fold itself round the dielectric C, thus varying the capacity between the plates B and D.

Small changes in the capacity may be read upon the scale E while complete revolutions of this scale can be read against graduations on the pointer J.

A light spring V holds the plate B up against the screw G.

Figure 4 is a section through another form of condenser in which there are two rigid conducting plates B with dielectric C cemented to them and two spring conducting plates D, D, kept apart by an elliptic shaped cam W mounted on the actuating screw G. As the handle on this screw is turned the cam W will vary the distance between the plates D and the plates B.

Having described my invention what I claim is:

1. A variable electrical condenser comprising a pair of rigid conducting plates spaced apart, a pair of oppositely bent plates intermediate the rigid plates, a sheet of dielectric adjacent each rigid plate and means for changing the curvature of the bent plates.

2. A variable electrical condenser comprising a pair of rigid conducting plates spaced apart, a pair of oppositely bent conducting plates between the rigid plates, a sheet of dielectric adjacent each rigid plate and adjusting means for varying the capacity consisting of a knob having a screw threaded member co-acting with the rigid plates and changing the spacing and the curvature of the resilient plates.

3. A variable electrical condenser comprising two rigid conducting plates, two flexible conducting plates, a sheet of dielectric between each rigid plate and the flexible plate adjacent thereto, said plates being pressed into contact with the dielectric at one end thereof and diverging toward the other end thereof and a cam engaging the diverging ends of the flexible plates and bending them to vary the spacing between the rigid and flexible plates.

4. A variable condenser comprising outwardly diverging rigid plates, flexible plates associated with said rigid plates, in spaced relation thereto, and means to vary the distance between the rigid and fixed plates.

5. A variable condenser comprising outwardly diverging rigid plates, flexible plates disposed between said rigid plates and spaced therefrom, and means to vary the distance between said rigid and said flexible plates.

EDWARD HERBERT TRUMP.