Dec. 11, 1934. P. F. SCOFIELD 1,983,680

VARIABLE CAPACITY

Filed Nov. 5, 1932

Fig. 1.

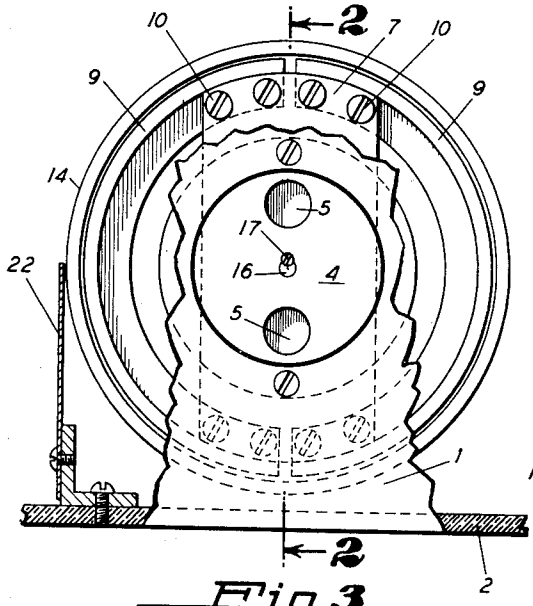


Fig. 2.

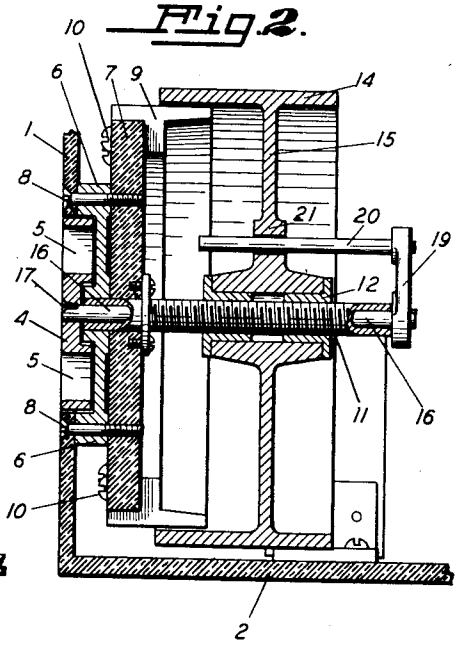


Fig. 3.

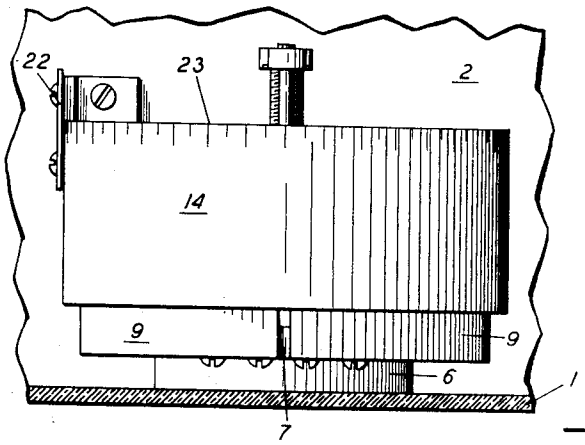
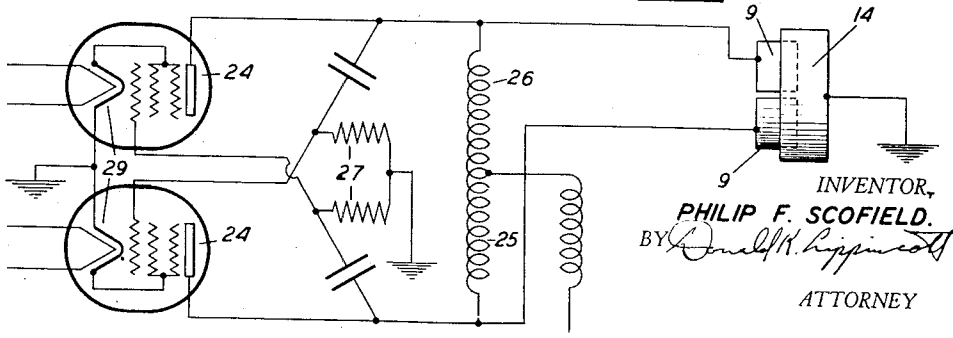


Fig. 4.



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VARIABLE CAPACITY

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Application November 5, 1932, Serial No. 641,473

3 Claims. (Cl. 175—41.5)

My invention relates to a variable capacity and more particularly to a capacity which may be used to tune a pair of balanced circuits and to provide an extremely fine adjustment.

Among the objects of my invention are: To provide a simple and effective variable capacity; to provide a variable capacity capable of being varied in minute amounts; to provide a variable capacity suitable for use with extremely high frequencies; to provide a variable capacity having a grounded rotor shielding the stator; and to provide a variable capacity having a single rotor and a plurality of stators in which the capacity between the rotor and each of the stators is varied by substantially the same amount.

Other objects of my invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but I do not limit myself to the embodiment of my invention herein described, as various forms may be adopted within the scope of the claims.

In the drawing, illustrating a preferred embodiment of my invention;

Figure 1 is a face view of the capacity as mounted on a panel, a portion of the panel being cut away.

Figure 2 is a sectional view of the capacity taken through a plane indicated by the line 2—2 in Figure 1.

Figure 3 is a top view of the capacity.

Figure 4 is a diagram showing the capacity as used in a balanced oscillator circuit.

In oscillators, or other circuits using balanced circuits, it is important to vary the tuning equally in the balanced tuned circuit in order to maintain proper operation over the wave-length range. It is also highly desirable that the capacity be changed in small increments, especially when high frequencies are involved.

My invention, broadly described, comprises a capacity having one or more stators, the complete stator assembly describing a cylindrical surface. A second unitary hollow cylindrical rotor is threaded on a hollow concentric shaft to cover the stator or stators, and is rotated by a drive shaft extending through the hollow shaft. As the rotor is rotated it covers more or less of the stators in equal amounts, and the capacity is changed accordingly. It is preferable to use a fine thread, and the amount of progression may be measured on a scale, and the degree of rotation also indicated to give an extremely fine adjustment. A preferred use of the capacity is in a balanced oscillator circuit in which there are two stators, and in which the rotor may be grounded to shield the stators.

Referring to the drawing in which the preferred type having dual stators is shown, a panel 1 of insulating material is mounted on a suitable base 2. The panel is bored out to admit a finger dial 4 provided with finger holes 5. It is desirable to mount the dial flush with the panel. A backing plate 6 surrounds the dial hole and is recessed to receive the dial. This plate is held between a stator mounting bar 7 and the panel by screws 8.

Stators 9—9, each in the form of half a cylindrical tube, are firmly mounted on the stator mounting bar by stator screws 10 and are slightly separated for insulation. Together they describe a cylindrical surface of a length dependent upon the area needed to give the desired maximum capacity.

Also, bolted to the stator mounting bar concentric with the described stator cylindrical surface, is a hollow screw 11 which extends forward through the bar and backing and toward the rear as far as desired. Threaded on this screw through an axial center bearing 12 is a rotor comprising a cylindrical tube 14 supported by an integral drive web 15, whose inside diameter is slightly greater than that of the stators. A portion of the rotor extends over and covers the stators so that when rotated on the screw, the rotor may be progressed to cover the stators completely, or be returned to a point where there is no coverage. A range from maximum to minimum capacity is thus obtained.

A drive shaft 16 extends through the hollow shaft carrying on the panel end the dial 4 secured by a lock screw 17, and on the opposite end a drive arm 19 bearing a reentrant drive pin 20 which slidably bits a drive hole 21 in the web 15. The rotor may thus progress when the dial is turned, the rotor sliding along the drive pin.

A progression scale 22 is mounted on the base 2 and calibrated in any convenient manner, preferably in number of turns using the edge of the rotor as an index, and the circumference 23 of the rotor is calibrated preferably in degrees and fractions thereof.

If the central screw 11 be of fine thread, such as 100 to the inch for example, an extremely fine variation of capacity may be obtained with a relatively large rotary movement of the rotor, and fine adjustments are easily made.

An ideal use for such a variable capacity is shown in Figure 4 which is a diagram of a balanced oscillator circuit reduced to its lowest

terms. Here a pair of oscillating vacuum tubes 24—24 is cross energized by and feed an inductance split into two equal portions 25 and 26. The stators 9 are connected to the outside turn of this inductance. The rotor 14 is grounded, and grid leaks 27 have a common ground, as have cathodes 29. It is customary to feed the anode potential through a choke 30 to the junction of the inductances 25 and 26.

The rotation of the rotor 14 may be said to change the capacity across both inductances 25 and 26, which, being identical, change in wave length equally. The capacity may also be thought of as two separate and identical capacities varying in equal amount across each of the individual inductances.

Such balanced oscillators are often used at ultra high frequencies and when so used the variable capacity as described is invaluable in obtaining small turning variation, as small capacity changes cause large changes in frequency. The capacity as described is, however, adapted to various circuits, either with a single stator or a multiplicity of stators, where it is desired to obtain small capacity changes with a relatively large adjusting motion.

I claim:

1. In combination, a panel, a stator comprising a portion having an exterior cylindrical surface rigidly mounted on one side of said panel, a hollow stationary screw mounted on said panel concentric with said stator, a conductive hollow cylindrical cover for said stator having an axial threaded bearing on said screw, a drive shaft extending through said hollow screw, a driving dial mounted on the said shaft on the other side of said panel, means slidably engaging said cover attached to the inner end of said shaft whereby said cover is rotated to change the capacity relation of said cover to said stator when said dial is rotated, and means for indicating both the progression along the screw and the degree of rotation.

2. In combination, a panel, a pair of stators each in the form of substantially half of a cylinder mounted on said panel and insulated from each other, a hollow stationary screw mounted on said panel concentric with said stators, a conductive cylindrical rotor adapted to cover closely but not touch said stators, said rotor having an axial threaded bearing on said screw, and means operable from the front of said panel to rotate said rotor, whereby the capacity between said rotor and each of said stators is changed, and means for indicating the amount of change.

3. In combination, a panel, a pair of stators each in the form of substantially half of a cylinder mounted on said panel and insulated from each other, a hollow stationary screw mounted on said panel concentric with said stators, a conductive cylindrical rotor adapted to cover closely but not touch said stators, said rotor having an axial threaded bearing on said screw, and means operable from the front of said panel to rotate said rotor, whereby the capacity between said rotor and each of said stators is changed by substantially the same amount, and means for indicating the amount of change.

PHILIP F. SCOFIELD.