

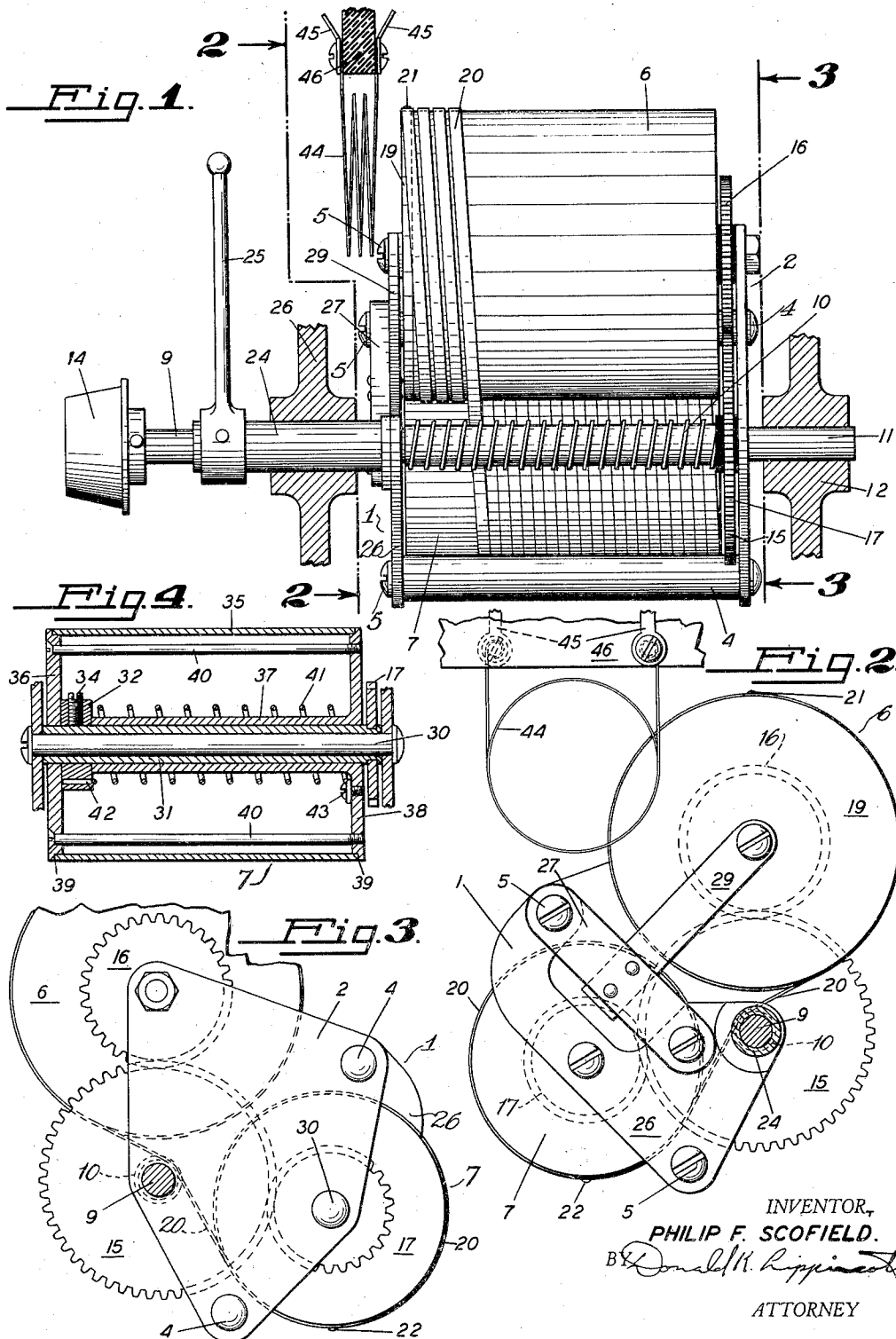
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P. F. SCOFIELD

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VARIABLE INDUCTOR

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VARIABLE INDUCTOR

Philip F. Scofield, Palo Alto, Calif., assignor to
Heintz & Kaufman, Ltd., San Francisco, Calif.,
a corporation of Nevada

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My invention relates to variable inductors, and more particularly to an inductor in which the inductance may be changed without giving rise to dead-end effects.

5 Among the objects of my invention are: To provide a variable inductor having no dead-end effects; to provide an inductor of the conductor-transfer type in which positive spacing is provided for the operating portion of the inductor; 10 to provide means for tensioning the conductor in an inductor of the conductor-transfer type; to provide means for coupling an inductor of the conductor-transfer type to a fixed coil; and to provide a compact, accurate and efficient inductor suitable for precision operation at high frequencies. 15

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. 20

Inductors of the conductor-transfer type are well known in the art, the general principle involved being the transfer of wire by rotation to or from a conducting drum or to or from an insulating drum. Such devices in the past, however, have not been highly satisfactory because of inaccurate wire spacing on the insulating drum, poor contact on the conducting drum, clumsy operation, and relatively large size. 25 30

My device has been designed to overcome the manifold objections to prior devices, and the resultant advantages will be clearly apparent from the following description. 35

Referring to the drawing:

Figure 1 is a side view in elevation of a preferred form of a device embodying my invention.

Figure 2 is a view of the device as seen from the front. 40

Figure 3 is a view of the device as seen from the rear.

Figure 4 is a sectional view of the conducting drum showing means for tensioning the conductor. 45

A frame is preferably formed by fastening a front plate assembly 1 and a back plate 2 together by means of studs 4 riveted to the back plate and secured to the front plate by screws 5. 50

An inductor drum 6 of suitable insulating material and a storage drum 7 of metal are mounted adjacent each other in the frame. Between them and mounted slightly below a tangent joining the two drums is a shaft 9 provided with a threaded portion 10. This threaded portion is 55

inside the frame and equal in length to the length of the drums. At the rear of the inductor the shaft passes through the frame to form a bearing end 11, which may be enclosed in a suitable rear bushing 12 and in front, extends through the frame and is terminated by an actuating knob 14. 60

A shaft gear 15 meshes on one side with an inductor drum gear 16 and on the other with a storage drum gear 17. Rotation of the shaft 9 therefore will rotate both drums. 65

The inductor drum is provided with a metal end plate 19 to which is secured the end of an inductor tape 20 by means of an inductor rivet 21. The tape is then wound on the inductor drum, passed under the threaded portion of the shaft 9 and is attached to the storage drum by means of a contact rivet 22. Rotation of the shaft 9 therefore will rotate both drums as before, and the tape will be transferred from one drum to the other. 70 75

A sleeve 24 is placed over the projecting forward end of the shaft and is solidly fastened at one end to the front plate assembly 1 and supplied with an actuating lever 25, at the other end. This sleeve is then mounted in a suitable front bushing 26, which may be the panel of a radio set, for example. 80

Rotation of the entire inductor may then be obtained by manipulation of the actuating lever 25, without disturbing the disposition of the tape on the drums, as determined by the actuating knob 14, and vice versa. 85

The front plate assembly 1 is a composite structure, comprising a front plate 26, an insulating bar 27 and an inductor bearing strut 29. As the end of the tape is electrically connected to the metal end plate 19, and the bearing strut 29 contacts this plate, electrical connection to the tape may be made by soldering or otherwise fastening a flexible wire to the bearing strut 29, which is of course isolated electrically from the rest of the frame by the insulating bar 27. The connection to the tape after it leaves the inductor drum may be made by connecting to the frame in any convenient place, as the storage drum, the frame, and the threaded portion of the screw over which the tape passes are all electrically interconnected with metal to metal contacts. 90 95 100 105

In order that a constant tension may be kept on the tape, the storage drum is made hollow, as shown in Figure 4, and comprises a storage drum shaft 30, secured at both ends to the frame. A drum sleeve 31 to which the storage drum 110

gear 17 is directly attached, is provided with a collar 32 adjustably fastened by means of a set nut 34.

The drum body is composed of a drum cylinder 35, a front end flange 36, and a combined spring bearing 37 and rear end flange 38, the spring bearing fitting over the drum sleeve 31. The drum cylinder fits in peripheral recesses 39 in each end flange and is held in place by stay bolts 40. A coil spring 41 fitted around the spring bearing 37 is attached to the collar 32 by having one end inserted in a spring hole 42, the other end being attached to the rear end flange by a spring screw 43.

Before the storage drum end of the tape is attached, a full or partial turn of the storage drum is made, against the spring. The tape is then attached as described, and thereafter the spring will place a constant tension on the tape as the drums are rotated.

A stationary coil 44 is provided, positioned to be closely adjacent the end of the inductor drum. Connection to this coil is made through contacts 45 spaced on a suitable insulator 46. As rotation of the entire inductor will change the relationship of this coil and the inductor drum, a varying coupling can thereby be obtained between the turns of the tape on the inductor drum and the stationary coil.

The operation of the device is simple. Rotation of the actuating knob 14 winds or unwinds the tape on the inductor drum. Rotation of the actuating lever 25 brings the tape on the inductor drum into varying coupling relationship to the stationary coil, either of these adjustments being effected without disturbing the other.

The tape is always positioned with positive spacing on the inductor drum, as the threaded portion 10 distributes the tape evenly and uniformly onto the drum. Good electrical contact between the tape and the threaded portion is always obtained, as the tape is slightly bowed by passing beneath the threads, the spring tension of the storage drum tending to straighten the bow and thus press the tape against the metal of the threads. The entire operation of the inductor is silent, and noisy contacts are eliminated.

Another feature of my invention may be utilized by making the storage drum smaller than the inductor drum. While a certain amount of spacing is necessary for the tape when on the inductor drum, no spacing is necessary on the storage drum, as the turns are shorted in any event. I may, therefore, desire to make the storage drum small enough that the edges of the tape turns on it are touching, and thus greatly reduce the overall space occupied by the inductor assembly.

In order that the tape be taken up on the storage drum in the exact amount it is discharged from the inductor drum, even though it is smaller. I change the gear ratio between the drums so that the storage drum revolves faster than the inductor drum, and just enough faster to take up the tape as discharged. In this manner I may provide any convenient spacing for the tape on the inductor drum and yet

make the storage drum of the minimum size necessary to store the tape with adjacent edges touching, the gear ratios being changed in proportion to the difference in size of the drums.

The complete inductor therefore has no dead-end effects associated with the changing of the effective inductance, and still may be manipulated both as to inductance and coupling as easily as ordinary inductors, the only increase in size being due to the addition of the relatively small storage drum, which does not, however, interfere with the coupling function.

I claim:

1. A variable inductor comprising, in combination, a frame, an inductor drum of insulating material, a storage drum of conducting material, a shaft having a threaded portion coextensive with said drums, said drums and said shaft being rotatably mounted in said frame, means for rotating said shaft, means for rotating said drums by the rotation of said shaft, a conductor having one end attached to said inductor drum and one end to said storage drum, said conductor being adapted to be wound from one of said drums to the other, said conductor passing over said threaded portion between said drums, said threads thereby determining the spacing of the turns of said conductor when wound on said inductor drum, means for mounting said inductor on a panel, and means for rotating said frame to vary the circumferential position of said drums with respect to a fixed point on said panel.

2. A variable inductor comprising, in combination, a frame, an inductor drum of insulating material, a storage drum of conducting material, a shaft having a threaded portion coextensive with said drums, said drums and said shaft being rotatably mounted in said frame, means for rotating said shaft, means for rotating said drums by the rotation of said shaft, a conductor having one end attached to said inductor drum and one end to said storage drum, said conductor being adapted to be wound from one of said drums to the other, said conductor passing over said threaded portion between said drums, said threads thereby determining the spacing of the turns of said conductor when wound on said inductor drum, a stationary inductance adjacent said insulating drum, and means for rotating said drum to vary the coupling between the conductor on said drum and said stationary inductance.

3. In a variable inductor assembly wherein a conductor is transferred from an insulating drum to a conducting drum by rotation of said drums the combination of means for rotating said drums and means for rotating the entire assembly with respect to an external reference point.

4. In a variable inductor assembly wherein a conductor is transferred from an insulating drum to a conducting drum by rotation of said drums the combination with a fixed inductance of means for rotating said drums and means for rotating the entire assembly with respect to said fixed inductance.

PHILIP F. SCOFIELD.