April 1, 1930. L. A. HAMMARLUND 1,753,182

VARIABLE COUPLING DEVICE

Filed Nov. 28, 1927 2 Sheets-Sheet 1

Fig. 1.

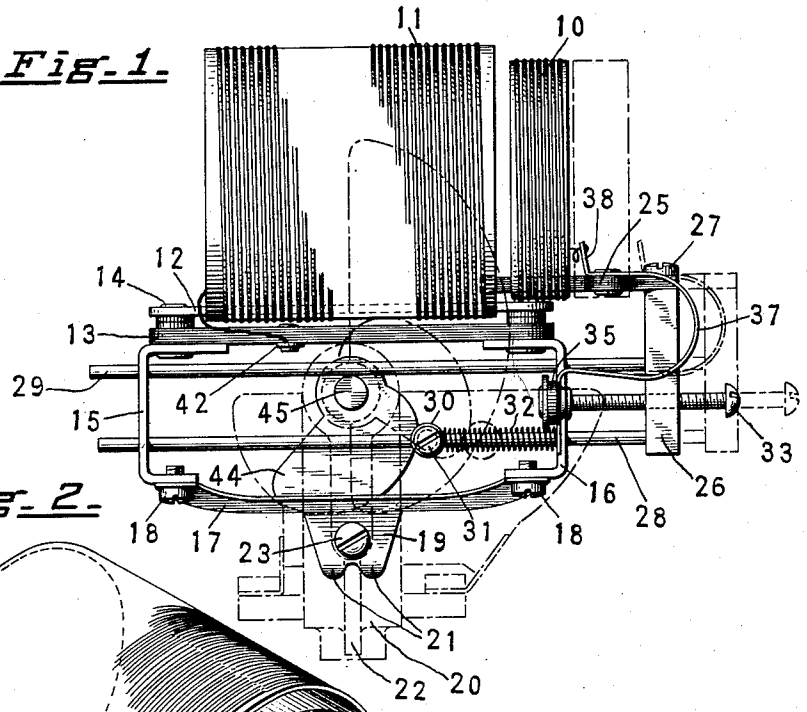


Fig. 2.

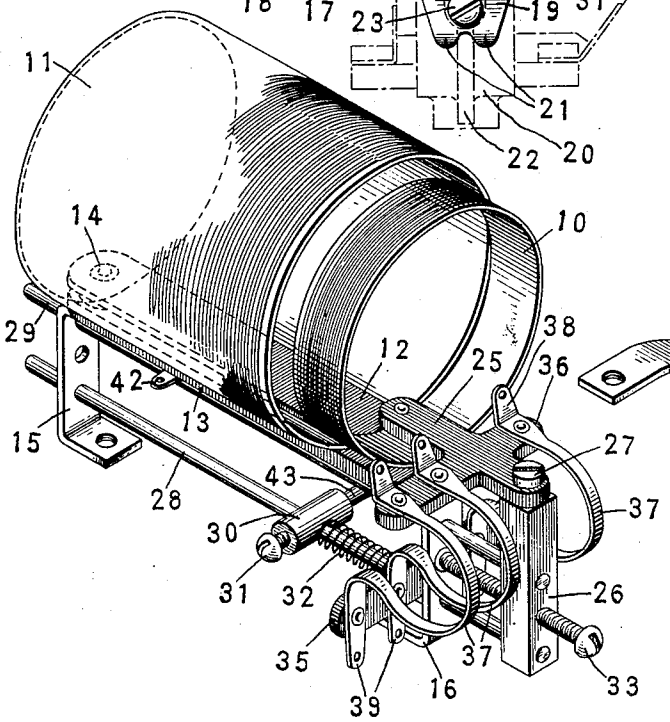
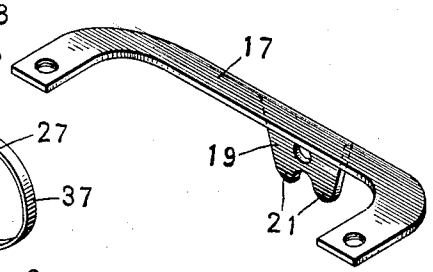


Fig. 3.



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Fig. 4.

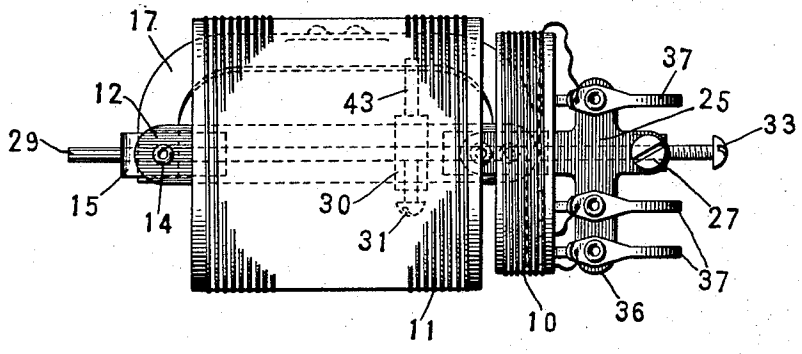


Fig. 5.

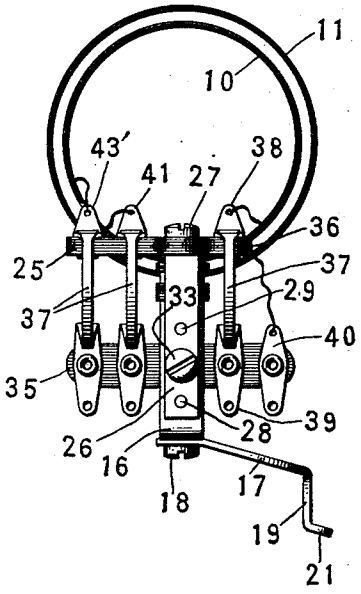
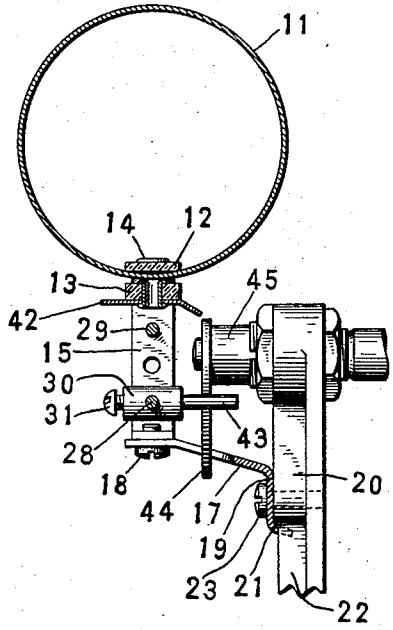


Fig. 6.



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UNITED STATES PATENT OFFICE

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VARIABLE COUPLING DEVICE

Application filed November 28, 1927. Serial No. 236,199.

My invention relates particularly to what are sometimes termed transformers.

One object is to provide a simple and reliable mechanism by which the coupling may be varied.

Another object is to provide a device of this character which is efficient under all ordinary conditions of use.

Another object is to provide a construction of this character the coupling of which can be adjusted or varied automatically or by means of a screw.

Another object is to provide a coupling device which can be readily attached to a condenser unit.

Another object is to provide a coupling transformer which can be readily operated simultaneously with the operation of a condenser.

In the preferred form, the invention contemplates primary and secondary coils mounted on supporting frames, one of which is slidable with respect to the other. One of the coil frames is adapted to be secured to a condenser frame; the other coil frame is adapted to be moved with the rotor of the condenser. Special resilient electrical connectors are provided between fixed circuit terminals and the movable coil.

Fig. 1 is a side view of an automatic coupling coil embodying one form of the improvements of my invention, and showing in dot and dash lines a condenser to which the mechanism may be attached.

Fig. 2 is a perspective view of the coil mechanism.

Fig. 3 is a perspective view of the supporting yoke.

Fig. 4 is a plan view of the coil mechanism.

Fig. 5 is an end view of the same.

Fig. 6 is a transverse sectional view showing the coil mechanism attached to a fragment of the condenser frame.

In the form shown, the primary coil 10 and the secondary coil 11 are mounted so as to permit of relative movement of one with respect to the other for varying the inductive relation. Each coil may be of any suitable construction with a suitable foundation for holding the various turns in position. The secondary coil is secured in a suitable manner to an insulating strip 12, the opposite ends of which are secured to a heavier insulating strip 13 in a suitable manner as, for instance, by means of hollow rivets 14 at opposite ends. The main frame consists of these strips 12 and 13 and end brackets 15 and 16, which are secured to the strips 12 and 13 by the rivets 14. The yoke member 17 is secured to the lower feet of the brackets 15 and 16 in any suitable manner, as for instance, by means of screws 18. For convenience in attaching the mechanism to a support, I have provided the yoke 17 with a lug 19. In this instance, the lug is designed and located so as to adapt the mechanism to be secured to frame 20 of a condenser of any suitable type. The lug has two spaced apart fingers 21, adapted to embrace the edges of a rib 22 on a condenser frame, and the lug is adapted to be clamped to the condenser frame by a single screw 23 for passage thru the lug.

The auxiliary or supplemental frame which carries the primary coil 10 consists of the insulating strip 25, which is secured in any suitable manner to the coil and in turn is secured to the post 26 by a screw 27. This frame has two rods 28 and 29, slidable thru openings in the brackets 15 and 16. A stop 30, slidable on the rod 28, is adapted to be secured in place by a screw 31. A spring 32 on the rod 28 is interposed between the stop 30 and the bracket 16 so as to tend to draw the primary coil 10 toward and into the secondary coil 11.

The screw 33 adjustable in the post 26 presses against the bracket 16 and serves as a stop to limit the movement of the coil 10 toward the coil 11. By turning the screw 33, the coil 10 may be moved toward or away from the coil 11.

The insulating cross pieces 35 and 36 serve as supports for the conducting springs 37. Each spring has a terminal such as 38 and 39, to which connections may be readily made.

Another terminal 40 may be carried by the cross piece 35. In the form shown, for instance, one lead may be connected to the terminal 39, which constitutes one end of

the spring connector 37 and one of the primary coil ends may be secured to the tip 38. The other end of the primary coil may be secured to the tip 41. One end of the secondary may be secured to the terminal 40 and the other end of the secondary may be secured to the terminal 42. The intermediate part of the primary may be connected to the terminal 43'. It should be understood, of course, that these circuit connections can be varied within the scope of my invention.

When it is desired to have the coupler operate simultaneously with a condenser, the mechanism may be provided with a pin 43 which projects from the stop member 30. This pin is adapted to project in the path of movement of a cam 44 which is secured to and rotatable with a part 45 of the rotor of the condenser. This cam 44 will be designed so as to move the primary coil at the proper rate with respect to the change in capacity of the condenser.

It should be understood, of course, that the coils and connections may be designed for any desired circuit, as I do not consider the invention limited except by the terms of the claims or as required by the state of the art.

In one use of the invention the movable coil 10 would be included in the anode-cathode circuit of a radio frequency amplifying tube and the stationary coil 11 would be included in the grid cathode circuit of the following radio frequency amplifying tube, and this latter coil would be tuned by a rotary variable condenser of any suitable type and the coil 10 will be moved simultaneously with the movement of the rotor of the condenser, thus keeping the coupling at an optimum value for all resonant frequencies.

The cross piece 36 may conveniently be formed integral with the longitudinal strip 25 either of one piece or a plurality of layers of insulating material and riveted or cemented to the foundation of the coil 10. The upper ends of the springs 37 may be conveniently riveted to this composite member. The cross piece 35 may also be formed of a plurality of layers of insulating material to which the lower ends of the springs 37 are riveted.

I claim:

1. A construction of the character described comprising two end brackets, two insulating strips connecting said brackets, a coil having one wall supported between said strips and a yoke connecting said brackets opposite said strips.

2. A construction of the character described comprising a frame including end brackets, an insulating strip connecting said brackets, a coil having one wall supported by said strip, a yoke connecting the opposite sides of said brackets and providing means for supporting said frame.

3. A construction of the character described comprising a coil, an insulating strip secured to the inner wall of the coil and extending from end to end thereof, brackets connected to the opposite ends of said strip, two parallel guide rods extending through said brackets and another coil supported by said guide rods and movable with respect to the first coil.

4. A construction of the character described comprising a frame, a coil supported by said frame at one side thereof, guide rods slidable in said frame outside of said coil, a post connecting said guide rods outside of said frame, an insulating plate secured to said post and a coil having one wall connected to said insulating plate and movable therewith with respect to the first coil.

5. A construction of the character described comprising a frame including end brackets, an insulating strip connecting said brackets, a coil secured to said strip, a second frame including a guide rod slidable in said brackets, an insulating plate carried by said second frame and including an arm, a coil having one wall supported by said arm, an insulating cross piece carried by one bracket and an insulating cross piece formed as a part of said plate and connecting conductor strips having their opposite ends secured to the respective cross bars and providing circuit terminals for the coils.

LLOYD A. HAMMARLUND.