Jan. 17, 1956 M. L. DOELZ 2,731,605

WIND-UP COIL

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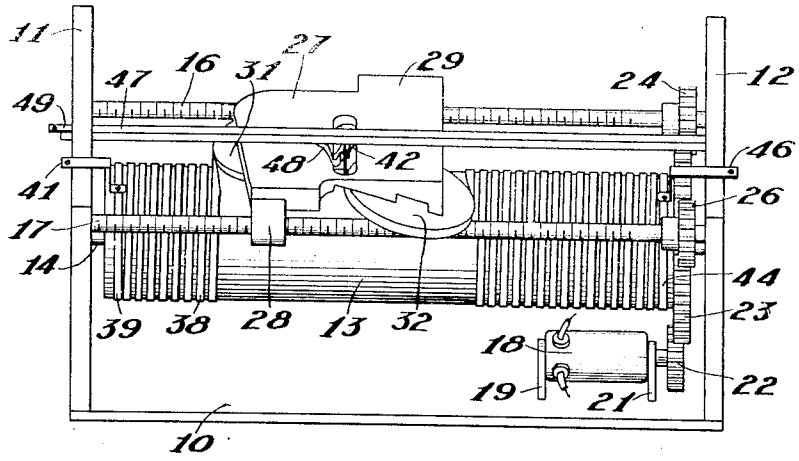


Fig 1

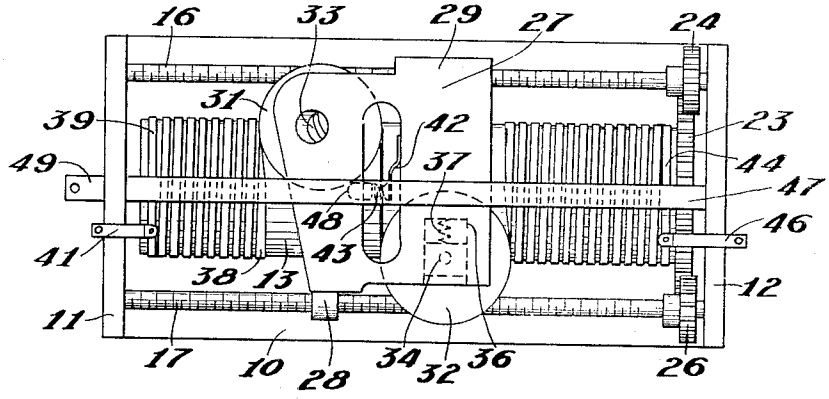


Fig 2

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WIND-UP COIL

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This invention relates to a variable inductor.

In electronics it is oftentimes desirable to use a variable inductance. Variable inductances may be constructed with a slide contact which engages a wound inductance. The contact may be connected electrically to one end of the coil so as to short out those turns between the slide contact and the end. The remaining turns are the effective ones. Even though some of the turns are shorted out, mutual inductance exists between them and the active turns.

It is an object of this invention, therefore, to provide means for physically separating shorted and effective turns of a variable inductance.

Another object of this invention is to provide means for increasing the Q obtainable with a variable inductance.

Yet another object of this invention is found in the provision for a rotatably supported coil form about which is wound two portions of conductors. A pair of rollers are mounted between the portions.

A feature of this invention is found in the provision for means that physically separate two portions of a coil.

Further objects, features, and advantages of this invention will become apparent from the following description and claims when read in view of the drawings, in which:

Figure 1 is a side view of the variable inductance of this invention, and

Figure 2 is a top view of the variable inductance.

Figure 1 shows a base plate **10** which has end plates **11** and **12** mounted thereon. The end plates may be made of insulating material, as for example, "Bakelite."

Rotatably supported between the end plates **11** and **12** is a coil form **13** which may be supported by an axle **14**. A pair of lead screws **16** and **17**, respectively, extend from end plates **11** and **12** parallel to the coil form **13** and are rotatably supported in the end plates.

A driving means **18**, as for example, an electric motor, is mounted to the base plate **10** by stand-offs **19** and **21** and has an output gear **22**. The coil form **13** supports a gear **23** which meshes with driving gear **22**. The lead screws **16** and **17** support gears **24** and **26**, respectively, which mesh with the gear **23**.

A roller assembly **27** has a pair of threaded projections **28** and **29** that engage the lead screws **16** and **17**, respectively. A pair of rollers **31** and **32**, respectively, are supported on the member **27** at an angle.

The roller **31** is mounted in a bearing **33**, as best shown in Figure 2, and the roller **32** is mounted in a bearing **34** which is movable in a slot **36** formed in the member **27**. A spring **37** biases the bearing **34** away from the roller **31**.

A flexible conductor **38** is wound about the coil form **13** and has one end attached to a band **39**. An output contact **41** is mounted on the plate **11** and engages the band **39**. The conductor **38** is wound about the coil form **13** until it is immediately below the roller **31** and then passes up over the roller **31** and between a pair of flexible contacts **42** and **43** carried on the member **27**. It then passes over the roller **32** and back around the opposite end of the coil form until it connects to a conductive band **44**.

A slide contact **46** is mounted on the end plate **12** and contacts the band **44**. Extending between end plates **11** and **12** is a conductive rod **47** and a flexible slide contact **48** extends from the member **27** to engage the rod **47**. The contact **48** is electrically connected to the contacts **42** and **43**.

A terminal **49** is connected to the member **47**.

In operation, electrical connections are made to contacts **41**, **46** and **49**. Contacts **49** and **41** might be connected together so as to short out the turns at one end of the coil. The position of the member **27** is controlled by the lead screws **16** and **17** which are driven by the motor **22** through the gears **23**, **24** and **26**. The gears **23**, **24** and **26** are formed so that the member **27** moves at the correct speed longitudinally of coil form **13** as the coil form is rotated.

As the coil form is rotated, the number of turns at one side of the coil will be increased and those at the other side will be decreased. If it is assumed that the contacts **41** and **49** are connected together, then those to the left of Figure 1 will be shorted by the member **27** and those to the right will be the effective turns.

It is to be noted that the shorted turns are physically separated from the active turns by the distance between the outer edges of the rollers **31** and **32**. As is well known to those skilled in the art, physical separation decreases mutual inductance between a pair of coils and thus the mutual inductance will be substantially less than in a coil where the shorted turns are kept immediately adjacent the active coils. This results in an inductance of high inertia and gives a higher Q than is obtained with less physical separation.

Although this invention has been described with respect to a particular embodiment thereof, it is not to be so limited as changes and modifications may be made therein which are within the full intended scope of the invention, as defined by the appended claims.

I claim:

1. Apparatus comprising, a base plate, a pair of end plates attached to said base plate, a coil form of insulating material rotatably supported between said end plates, a pair of lead screws rotatably supported between said end plates, a roller assembly threadedly supported by the pair of lead screws, a pair of rollers mounted on the roller assembly, a flexible conductor wound about one end of said coil form, passing over the rollers and wound about the opposite end of said coil form, a first wiper contact mounted to one end plate and engageable with one end of said flexible conductor, a second wiper conductor attached to the other end plate and engageable with the opposite end of said coil, a third wiper contact mounted on said roller assembly and engageable with said flexible conductor between the rollers, a driving means connected to said coil form and said pair of lead screws, a conducting bar mounted between said end plates, and a fourth slide contact extending from said roller assembly to said conductor bar.

2. A variable inductor comprising, a base plate, a pair of end plates mounted on said base plate, a coil form of insulating material rotatably supported between said end plates, a pair of lead screws rotatably supported between said end plates, a roller assembly threadedly received on said lead screws, a pair of rollers supported by said roller assembly so that their planes make an obtuse angle, one of said rollers movable transversely of said roller assembly and spring biased away from the other roller, a pair of conducting bands attached adjacent opposite ends of said coil form, a flexible conductor attached to one of said conducting bands and wound about one end of said coil form, said flexible conductor passing over the first

roller and around the second roller, and then wound about the opposite end of the coil form and connected to the other conducting band, a first wiper contact mounted on said first end plate and engageable with said first conductive band, a second wiper contact connected to the other end plate and engageable with the other end band, a third wiper contact mounted to said roller assembly and engageable with said flexible conductor between said rollers, a conductive shaft extending between said end plates, a fourth wiper contact connected to said third wiper contact and engaging said conducting shaft, and a driving means connected to the pair of lead screws and the coil form.

3. Movable carriage means for winding and unwinding a flexible wire received on opposite ends of a single rotatable coil form supported by a frame member comprising, a pair of threaded shafts rotatably supported adjacent said coil form by said frame, gears fixedly provided on said coil form and threaded shafts in meshed relationship to relatively rotate them with the pitch of said threaded shafts and said wound wire actuated in the same direction, threaded projections secured to said carriage and received on said threaded shafts, a pair of pulleys supported rotatably at opposite ends of said carriage and each inclined toward and receiving said flexible wire, said flexible wire received in an S-form over the outer portions and between said pulleys, a contact fixed on said carriage and slidably contacting the flexible wire as it passes between said pulleys, and said pulleys spring biased away from each other transversely of said coil axis whereby said flexible wire is maintained taut at all times.

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