Nov. 25, 1941. T. S. LEOSER 2,263,972

LOOP WINDER

Filed Feb. 5, 1941 2 Sheets-Sheet 1

Fig. 2

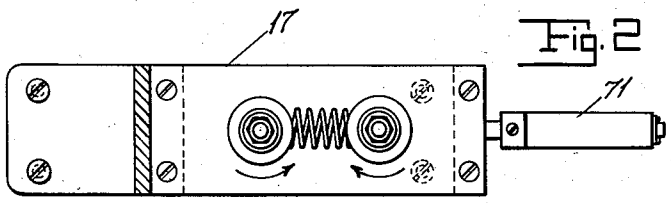

Fig. 1

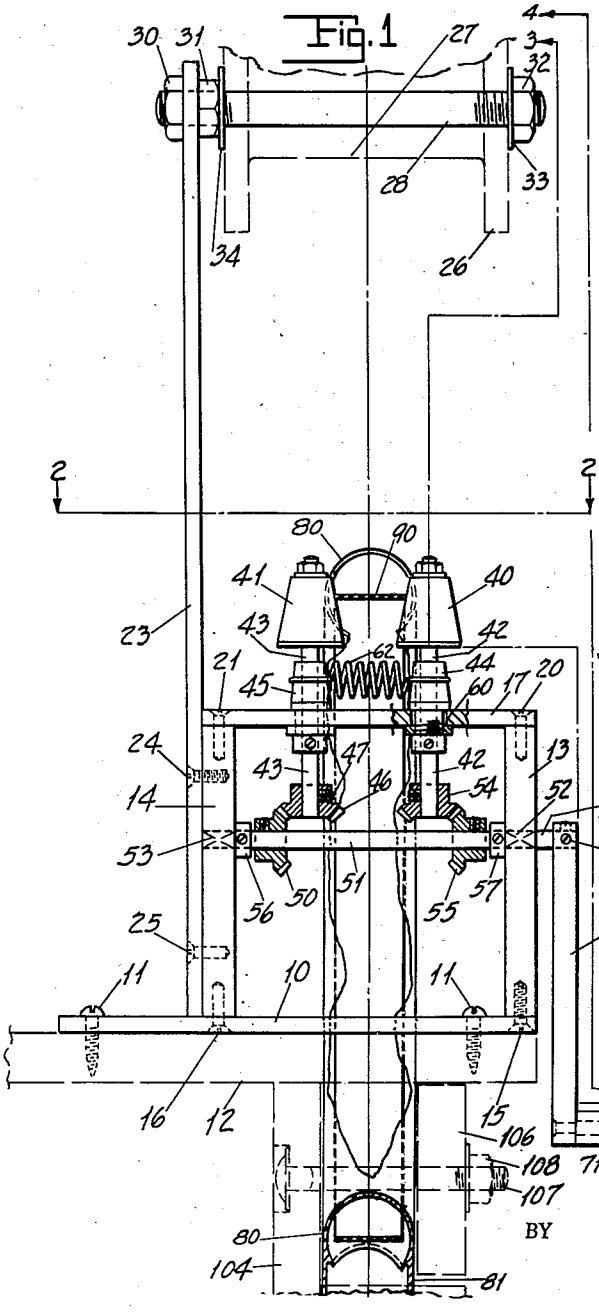

Fig. 3

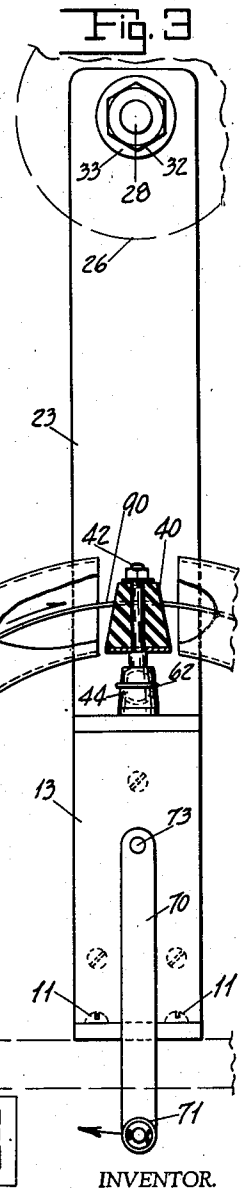

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Fig. 4

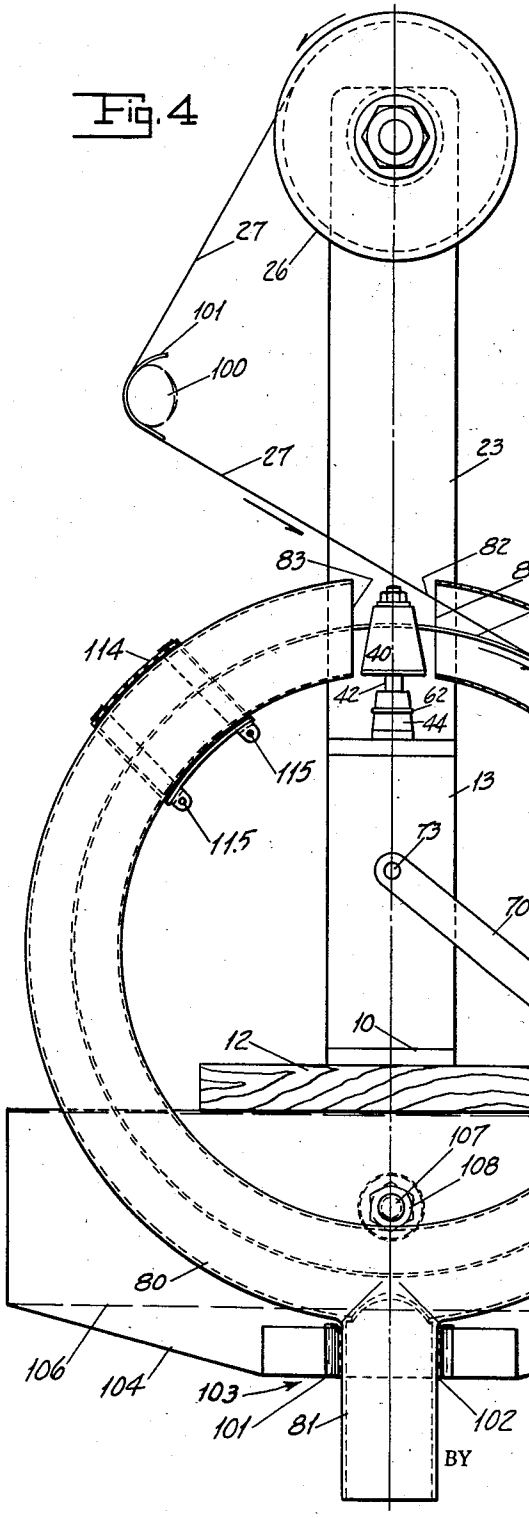
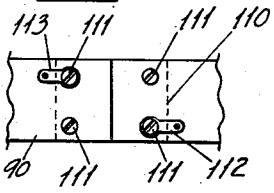


Fig. 5



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Patented Nov. 25, 1941

2,263,972

UNITED STATES PATENT OFFICE

2,263,972

LOOP WINDER

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Application February 5, 1941, Serial No. 377,436

6 Claims. (Cl. 242—4)

This invention relates to loop winders, and more particularly to a loop winding machine for winding inductive or other loop particularly for use in connection with radio receivers for the purpose of intercepting radiant energy and transmitting the same to an appropriate receiver.

Heretofore, in the formation of such loop antennae, particularly where it was desirable to enclose the same within an appropriate housing, it has been necessary to wind the loop first on its mandrel or form and then insert the same in an appropriate housing.

An object of the present invention is to provide a loop winding means whereby the loop antenna may be wound on its mandrel or form within the housing.

In addition to the problem of winding the loop on its form within a housing, applicant was faced with the requirement that the loop should preferably be protected by an annular housing which closely and intimately surrounds the same.

A further object of the present invention, therefore, is the provision of appropriate mechanism for winding a loop antenna on its mandrel or form while the mandrel or form is within the housing.

These and many other objects of the present invention will in part be pointed out and in part be apparent from the following description and drawings in which:

Figure 1 is a side elevation, partly in cross-section, of my novel loop winding mechanism.

Figure 2 is a cross-sectional view taken along line 2, 2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a view, partly in cross-section, taken along line 3, 3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a view in elevation of the loop winding mechanism taken along line 4, 4 of Figure 1, looking in the direction of the arrows.

Figure 5 is a cross-sectional view taken along line 5, 5 of Figure 4 looking in the direction of the arrows.

Referring now to the figures, the loop winding mechanism is supported in any suitable manner on a base 10 which is secured in any appropriate manner, as for instance by the screws 11, to a platform or table 12.

Side frame members 13 and 14 are supported by the base 10 and secured thereto in any suitable manner, as for instance by the bolts 15 and 16; and a top frame plate 17 is secured to and supported by the side frame members 13 and 14, being attached thereto also in any suitable manner, as for instance by the bolts 20 and 21.

A vertical standard 23 is secured to one of the side plates 14 by the bolts 24 and 25 and carries, at the upper end thereof, any suitable means which may be used for supporting a spool 26 upon which the wire 27 (see also Figure 4) may be wound, preliminary to its winding on the mandrel or form hereinafter described.

One means for removably mounting the spool 26 carrying the wire on the standard 23 comprises a bolt 28 which may be passed through the central opening of the spool, the said bolt being secured by suitable nuts 30 and 31 to the standard 23, and the spool being secured in place on the bolt 28 by any suitable means, such as the nut 32. The nuts 31 and 32 may be spaced from the spool, if that is desired, by washers 33 and 34.

The loop winding mechanism itself consists of a pair of vertically arranged friction cones 40 and 41, the surfaces of which are of any suitable frictional material and preferably are of rubber.

The cones 40 and 41 are each mounted on their respective rotatable shafts 42 and 43 which are rotatable in the journal 44 and 45.

The journal 45 is fixedly mounted with respect to the top plate 17 and is not movable with respect thereto, but the shaft 43 may rotate freely in the said journal and is maintained against any longitudinal movement therein.

The shaft 43 has at the lower end thereof opposite the cone 41 a bevelled gear 46 which is secured thereto by, for instance, locking screw 47. This bevelled gear 46 meshes with the bevelled gear 50 at the shaft 51, which latter shaft rotates in suitable bearings 52 and 53 in the side frame plates 13 and 14.

The shaft 42 carrying cone 40 and supported by the journal 44 likewise extends below the journal in the same manner as does shaft 43 and is likewise secured to the lower end thereof on bevelled gear 54 which meshes with bevelled gear 55 on the shaft 51.

Collars 56 and 57 on the shaft 51 serve accurately to position the said shaft with respect to the frame members so that the bevelled gears will be properly engaged.

Journal 44, however, differs from journal 45 in that it passes through a somewhat elongated slot 60 in the top plate 17 of the frame and thus is capable of movement toward journal 45.

A tension spring 62 is engaged at one end with journal 44 and at the other end with journal 45,

and serves to force these journals toward each other.

The adjustment required between cones 40 and 41 is, however, relatively slight and, hence, the slot 60 is relatively small in extent.

The teeth on bevelled gears 54 and 55 are sufficiently deep so that they will be in connection with each other no matter what position the journal 44 assumes in the slot 60. Should it be necessary in an appropriate case to make the slot 60 wider to make the machine adjustable for mandrels or forms which differ greatly in size, then bevelled gear 55 may be mounted in a sliding sleeve of shaft 51 so that it may be moved so that it will be in engagement with the bevelled gear 54. However, for the purposes as hereinafter described, the adjustment required which results in movement of the journal 44 in slot 50 is sufficiently slight as to preclude any possibility of disengagement with gears 54 and 55.

A crank 70 having a suitable handle 71 is keyed at 72 to the projecting end 73 of the shaft 51 so that rotation thereof will result in rotation of shaft 51 and through the studs of bevelled gears herein described will likewise result in rotation of cones 40 and 41.

The arrangement of bevelled gears hereindescribed also ensures that the inner surfaces of cones 40 and 41 will be rotating in the same direction.

When, now, it is desired to utilize the loop winder of the present invention in order to wind a loop antenna on a mandrel within a housing, a suitable annular housing 80, having an appropriate stem 81, is supported in any suitable manner, as seen in Figures 4 and 1, so that the upper portions thereof terminate at the cones 40 and 41.

The annular housing 80, which may be used in connection with the loop which is to be wound by the present machine, has an opening at 82 at the upper portion thereof, as seen in Figure 4; and the free ends 83 and 84 of the housing at the opening terminate just short of the cones 40 and 41 on either side. This housing may be supported by a suitable clamp which engages the stem 81 or by any other suitable supporting means so that it will remain in position shown in the figures.

One way of supporting the housing 80 is by placing the stem 81 between the jaws 101 and 102 of the clamp 103 which in turn is supported by the bracket 104 which depends from table 12. A securing plate 106 may then be secured on the side of the loop housing opposite bracket 104 and held in position on the bolt 107 by the nut 108 to prevent the loop housing from rotating during the winding operation.

The form or mandrel 90 on which the loop is to be wound consists of a flat flexible insulating strip of, for instance, Bakelite. An end thereof is inserted at either the opening 84 or 83 of the housing and pushed through around the housing until the end emerges from the other openings 83 and 84. The two free ends of the mandrel or form 90 are then secured together in annular form in the position shown in Figure 4, care being taken to make the dimension of the circular mandrel or form 90 bear the same relationship to the walls of the housing as is shown in Figure 4. This may be ensured by suitable securing means at each end of the flexible strip which are to interengage. One form of such securing means is shown in Figures 4 and 5 and consists of a plate 110 secured by bolts 111 to the ends of the form 90.

This securing means may also be utilized to secure the terminals of the loop when it is to be wound.

The mandrel or form 90, once it has been passed through the housing 80 and secured as shown in Figure 4, may then be pressed between the cones 40 and 41 as shown in Figure 1 and frictionally engaged therebetween.

This frictional engagement may be secured by pushing the mandrel 90 down into the position shown in Figure 1 by finger pressure.

The spring 62 will yield sufficiently to ensure proper frictional engagement between the mandrel or form 90 and the cones 40 and 41.

It will now be seen that rotation of the cones 40 and 41 will, in the manner previously described, cause the mandrel 90 to rotate within the housing.

The end of the wire 27 may be secured in any suitable manner, as for instance by securement to the lug 112 carried by one of the bolts 111, to the mandrel or form 90 so that rotation of the mandrel or form 90 will cause the wire to be wound up on the said form.

The operator's finger 100 carrying a suitable protecting glove or other member 101 may be utilized to appropriately tension the wire 27 while it is thus being wound up and to guide the wire properly so that it will wind up in proper relationship on the mandrel or form.

When a sufficient number of turns have been wound on the mandrel, the winding portion may then be stopped, the wire cut, and connected to an appropriate terminal 113 carried by another bolt 111; the housing 80 may then be removed from its support and the mandrel 90 may be appropriately permanently positioned in any suitable manner within the housing 80 and thereafter any suitable means, for instance, a sliding sleeve 114 on the housing 80 may be used to close up the gap 82. The sliding sleeve 114 may be clamped in position by appropriate screws or bolts passing through opposite ears or lugs 115 of clamps which encircle the sleeve.

The terminals in actual use may be led through the stem 81 of the housing for an effective connection to the radio receiver.

The operation and use of the loop winding mechanism, therefore, consists of positioning the housing 80 in the manner shown in Figures 1 and 4 so that the gap 82 is locked at the region of the cones 40 and 41; the formation of the mandrel 90 within the housing into circular form; the pressing of the mandrel 90 between cones 40 and 41 so that rotation of the cones will result in rotation of the mandrel. Thereafter rotation of the crank 70 causes rotation of the shaft 51 which, through the bevelled gears hereinbefore described, causes cones 40 and 41 to rotate, thus rotating the mandrel or form 90. By this means, therefore, the loop is wound up on the mandrel.

Many variations of the foregoing device should now be obvious. A suitable spring tensioning or other tensioning means can be used instead of the finger 100 to appropriately position the wire. Suitable guide means may also be utilized for causing the wire to follow an appropriate curve while it is being wound on the form.

If desired, a counter may be used to count the number of turns and ensure that the inductance of the loop will be correct.

And if desired also a motor may be utilized instead of a hand crank 70 for actually winding the loop. This type of winder may, of course be

utilized in connection with other types of loops or forms and in connection with other types of housings.

Since the apparatus of my present invention is capable of so many variations which should now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein, but only by the appended claims.

I claim:

1. In a loop winder for winding a wire on a continuous hollow cylindrical form, an operating mounting having a pair of rotatable cones vertically arranged with the apices thereof upwards; the apices of the cones being spaced apart a greater distance than the width of the form taken parallel to its axis, the bases of the cones being spaced apart a lesser distance than said width of said form, said form being engageable between said rotatable cones with a portion of the periphery thereof placed therebetween, the sides of said cones abutting portions of opposite edges of the form, the remainder of the form being suspended thereby, rotation of the cones bringing successive portions of the edges of the form therebetween and rotating said form.

2. In a loop winder for winding a wire on a continuous hollow cylindrical form, an operating mounting having a pair of rotatable cones vertically arranged with the apices thereof upwards; the apices of the cones being spaced apart a greater distance than the width of the form taken parallel to its axis, the bases of the cones being spaced apart a lesser distance than said width of said form; said form being engageable between said rotatable cones with a portion of the periphery thereof placed therebetween, the sides of said cones abutting portions of opposite edges of the form, the remainder of the form being suspended thereby, said cones being horizontally movable, means biasing said cones toward each other for ensuring frictional engagement thereby with said edges of said form, rotation of the cones bringing successive portions of the edges of the form therebetween and rotating said form.

3. In a loop winder for winding a wire on a continuous hollow cylindrical form, an operating mounting having a pair of rotatable cones vertically arranged with the apices thereof upwards; the apices of the cones being spaced apart a greater distance than the width of the form taken parallel to its axis, the bases of the cones being spaced apart a lesser distance than said width of said form; said form being engageable between said rotatable cones with a portion of the periphery thereof placed therebetween, the sides of said cones abutting portions of opposite edges of the form, the remainder of the form being suspended thereby, means biasing said cones toward each other for ensuring frictional engagement thereby with said edges of said form, said cones having yielding frictional surfaces for further ensuring said frictional engagement, rotation of the cones bringing successive portions of the edges of the form therebetween and rotating said form.

4. In a loop winder for winding a wire on a continuous hollow cylindrical form, an operating mounting having a pair of rotatable cones vertically arranged with the apices thereof upwards; the apices of the cones being spaced apart a greater distance than the width of the form taken parallel to its axis, the bases of the cones being spaced apart a lesser distance than said width of said form; said form being engageable between said rotatable cones with a portion of the periphery thereof placed therebetween, the sides of said cones abutting portions of opposite edges of the form, the remainder of the form being suspended thereby, said cones being horizontally movable, means biasing said cones toward each other for ensuring frictional engagement thereby with said edges of said form, said biasing means permitting said cones to be spread apart to permit said form to be pressed therebetween, rotation of the cones bringing successive portions of the edges of the form therebetween and rotating said form.

5. In a loop winder for winding a wire on a continuous hollow cylindrical form while said form is suspended in an annular housing, said housing having an open top; an operating mounting having a pair of rotatable cones vertically arranged with the apices thereof upwards; the apices of the cones being spaced apart a greater distance than the width of the form taken parallel to its axis, the bases of the cones being spaced apart a lesser distance than said width of said form; means for supporting the housing with the open top thereof adjacent the operating mounting, the opposite edges of that portion of the form registering with said open top of the housing being engageable between said rotatable cones with a portion of the periphery thereof, the remainder of the form being suspended thereby within the annular housing, rotation of the cones bringing successive portions of the edges of the form therebetween and rotating said form within said annular housing.

6. In a loop winder for winding a wire on a continuous hollow cylindrical form while said form is suspended in an annular housing, said housing having an open top; an operating mounting comprising a pair of opposed conical rotatable elements, means for supporting the housing with the open top thereof adjacent the operating mounting, the portion of the form registering with said open top of the housing being engageable between and supported by said opposed rotatable elements; the remainder of the form being suspended therefrom within the annular housing, means for rotating said opposed conical rotatable elements for moving successive portions of the periphery of the form therebetween for rotating the form within the annular housing.

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