Nov. 20, 1956 P. J. ICENBICE 2,771,250

CORRECTOR UNIT FOR A COIL WINDING MACHINE

Filed June 9, 1953 2 Sheets-Sheet 1

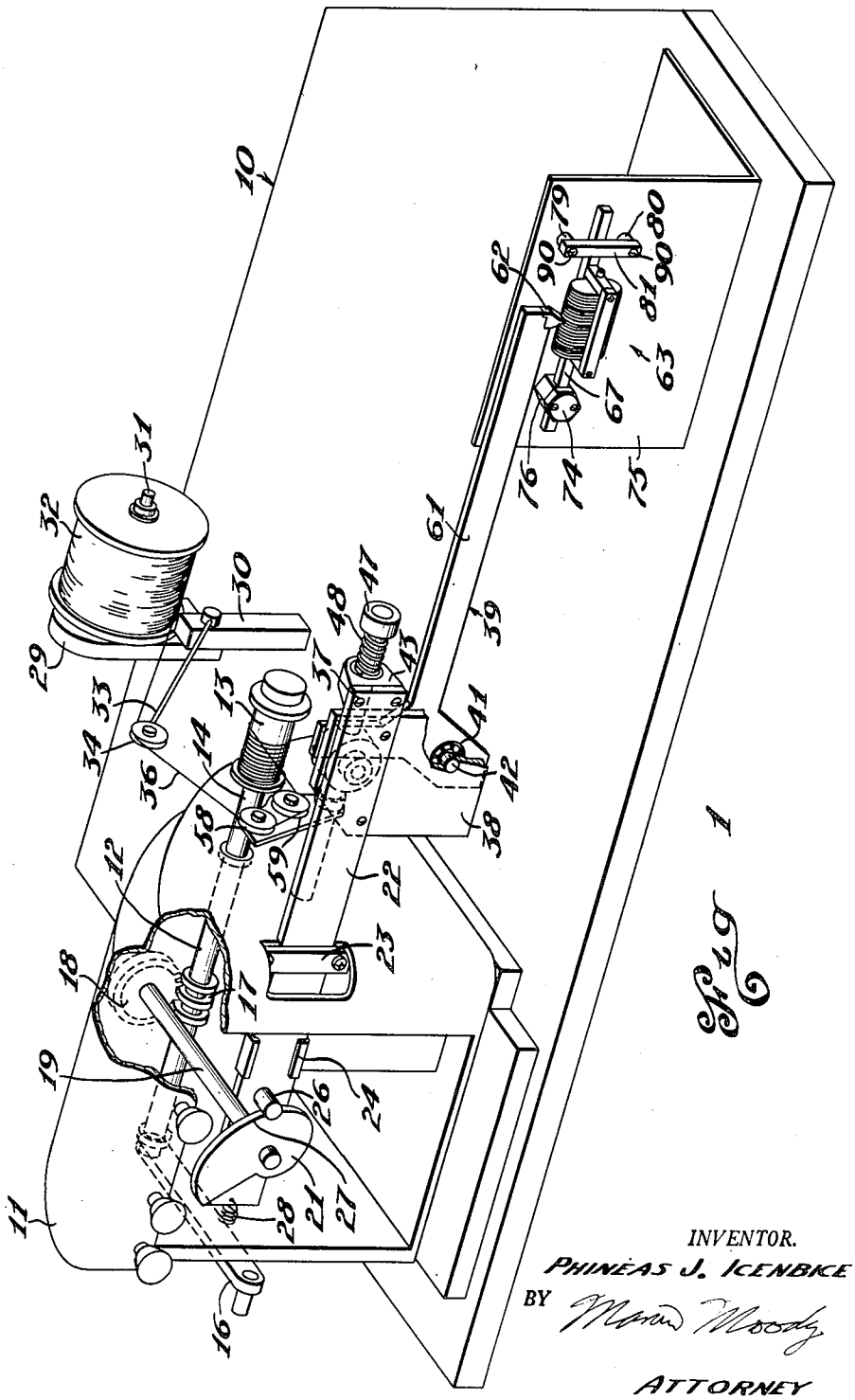


FIG 1

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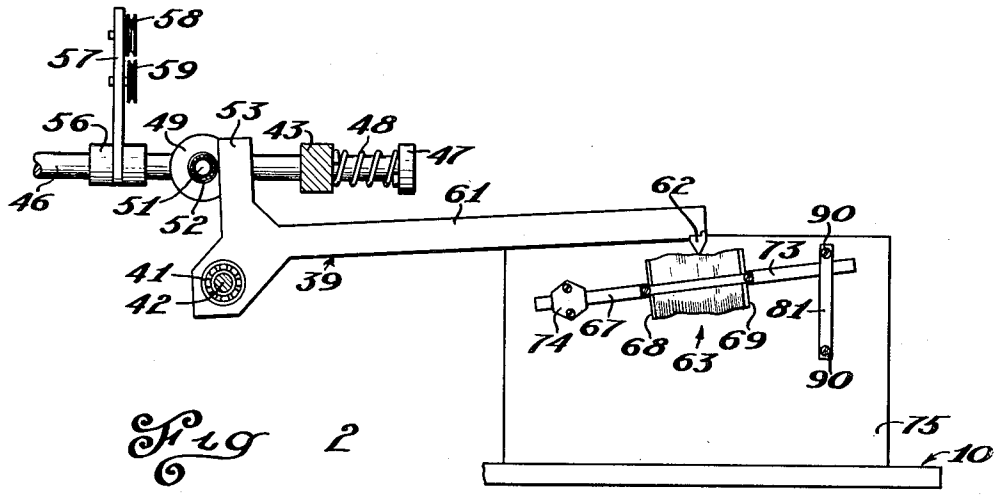


Fig 2

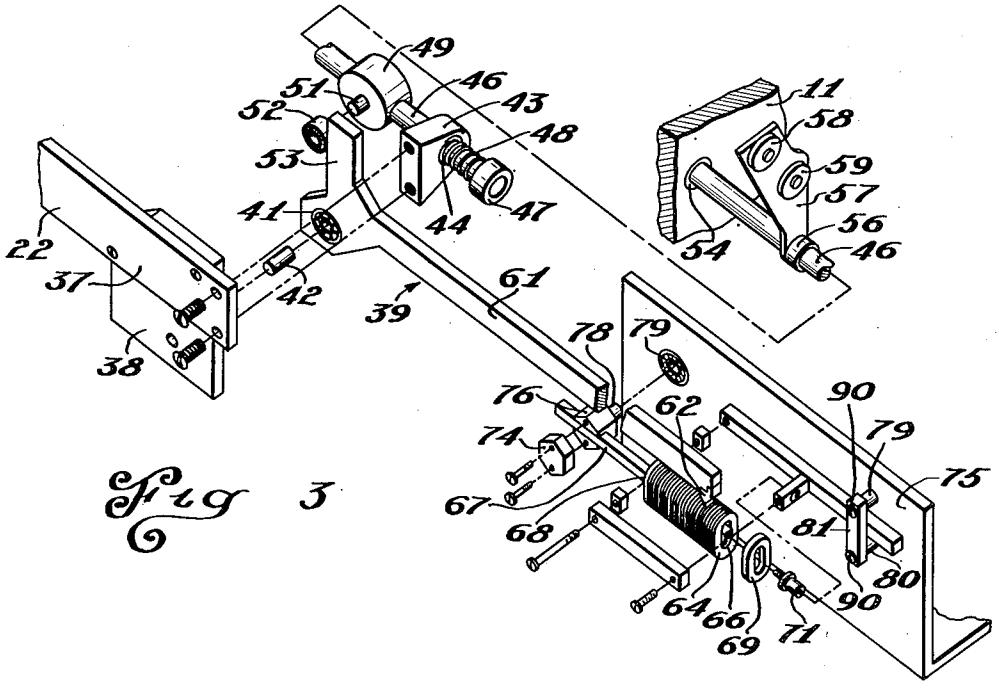


Fig 3

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United States Patent Office 2,771,250
Patented Nov. 20, 1956

2,771,250

CORRECTOR UNIT FOR A COIL WINDING MACHINE

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Application June 9, 1953, Serial No. 360,548

4 Claims. (Cl. 242—9)

This invention relates in general to coil winding machines, and in particular to a corrector mechanism for a coil winding machine which corrects for slight discrepancies in the tuning characteristics of a coil.

In electronics it is oftentimes desirable to utilize wire wound coils to form inductive elements in various circuits. Such coils have been used for many years and various methods of winding them have been developed. One way of winding them is manually, wherein the wire is merely wound about a coil form and attached at either end. Various machines have been developed for winding coils which utilize the principle of a bobbin winder on a sewing machine, wherein a reel of wire is supported near a coil form that is rotated. A wire guide controls the position of the wire on the coil form. The wire guide may be mounted on a movable arm which is controlled by a slide that is cam driven so that as the coil form is rotated simultaneous motion of the slide arm will occur due to the cam. Any desired turn versus distance characteristic is obtainable. This, of course, requires a cam for each variation in pitch in the coils.

It is an object of the present invention to provide a corrector mechanism for a wire winding machine so that the coil may be compensated.

Another object of this invention is to provide a corrector mechanism for a cam driven wire winding machine so as to obtain any desired inductance characteristic.

A feature of this invention is found in the provision for a cam driven coil winding machine wherein the wire guide member is secondarily controlled by a pivot arm which rides on an adjustable means.

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

Figure 1 is a partially cut away isometric wire of the coil winding machine of this invention;

Figure 2 is a detailed side view of the corrector mechanism of this invention; and

Figure 3 is an exploded view of the corrector mechanism of this invention.

With reference to Figure 1, a base plate designated generally as **10** has mounted thereon a housing **11** which rotatably supports a longitudinal shaft **12**. A coil form **13** may be received on the end **14** of the shaft **12** externally of the housing.

A driving means which, for simplicity is shown as a crank **16**, is attached to the shaft **12** to provide a driving force. It is to be realized, of course, that the machine may be made automatic by connecting a suitable motor. A worm **17** is formed on the shaft **12** and engages a gear **18**, firmly attached to a transversely rotatably supported shaft **19** that extends through the housing **11**. A cam **21** is detachably connected to the shaft **19**.

A slide arm **22** is received through guides **23** and **24** attached to the housing **11** so that the arm **22** may be moved longitudinally relative thereto.

A transverse pin **26** engages the cam surface **27** so as to drive the slide arm **22**. A spring **28** is attached to the housing and to the slide arm so as to bias the pin **26** against the cam surface **27**.

Attached to the base plate **10** is a stand-off **29** that has a horizontal shaft **31** attached thereto. A reel of wire **32** may be placed on the shaft **31**. An arm **33** is connected to another stand-off **30** and carries a pulley **34** over which the wire **36** extends.

The end **37** of slide arm **22** has attached thereto, as best shown in the exploded view of Figure 3, a generally rectangular plate **38**. A follow arm **39** is generally L-shaped and has a bearing **41** mounted near the corner thereof which is receivable over a pin **42**. Pin **42** is attached to the plate **38** so that lever arm **39** may rotate relative thereto.

A bracket **43** is also attached to the end **37** of the slide **22** and is formed with a transverse opening **44** through which a guide support shaft **46** extends.

A sleeve **47** is mounted on shaft **46**. A spring **48** is mounted between the bracket **43** and sleeve **47** so as to bias shaft **46** toward the right relative to Figures 1, 2 and 3.

An enlarged disc **49** is mounted on shaft **46** and supports a pin **51** which carries a bearing **52**. In the assembled position the short arm **53** of the follow arm **39** engages the bearing **52** so as to control the longitudinal position of the guide support arm shaft **46** relative to the slide **22**.

The guide arm shaft **46** passes through a guide opening **54** formed in the housing **11**. Also attached to the guide arm shaft **46** is a bracket **56** best shown in Figure 2, which has an upwardly extending portion **57** on which are mounted a pair of guide pulleys **58** and **59**. The wire **33** from the coil **32** passes over the pulleys **34**, **58** and **59** and to the coil.

The long leg **61** of the follow arm **39** is formed with a sharp point **62** which is engageable with a washer assembly designated generally as **63**. The washer assembly comprises a plurality of elongated or ovel shaped washers **64** which are formed with elongated or oval shaped openings **66** therein through which extends a square shaft **67**. A pair of end plates **68** and **69** are attached at opposite ends of the washer assembly on the shaft **67** and may be tightened by a set screw **71** so as to form a rigid assembly of the washers. It is to be noted that the washers may move up and down relative to the shaft but may not rotate because the shaft **67** is square.

An upright plate **75** is mounted to the base plate **10**. A pair of oppositely cut plates **74** and **76** are attached together and one end of the shaft **67** extends therethrough. The two plates **74** and **76** are attached to a suitable bearing **77** by means of a pin **78**. The bearing **77** is attached to plate **75**. A pair of horizontal stand-offs **79** and **80** are attached to plate **75** and a bar **81** is attached to the stand-offs by set screws **90**. The shaft **73** extends therethrough and the bar **81** may be tightened on shaft **73** by a pair of set screws **90** which are attached to the stand-offs. When they are tightened they limit the motion of the shaft **73**.

In operation the coil form **13** is placed on the spindle shaft **14** and the shaft is rotated by the crank **16**. As previously stated this may be driven by a motor if desired. Due to the rotational relationship caused by the worm and gear **17** and **18**, the cam **21** will turn, thus causing the slide member **22** to move relative to the housing **11** and coil form **13**. This causes the wire guide pulleys **58** and **59** to move an vary the pitch of the coil. The variation depends upon the shape of the cam **21**.

Let it be assumed that the washer assembly **63** is mounted so as to be straight and horizontal, such as

shown in Figure 1. Suppose that after the coil is wound and tested, it is seen that in certain portions of the curve slight inaccuracies exist. These inaccuracies may be compensated by adjusting the two variables of the tuning corrector assembly. These are the angle of the shaft **73** and the shape of the upper curve formed by the washer assembly **63** upon which the point **62** of the follow arm **39** rests.

When it is desired to wind a coil with a particular inductance characteristic, a cam which has been cut approximately for this characteristic is attached to the shaft **19** and a sample coil is wound. After it is wound its inductance versus slug position characteristic is plotted and the shape noted. If at certain points in the curve, undesirable effects are noted, adjustment may be made in two ways by the corrector mechanism of this invention.

The first method of correcting is to loosen the bar **81** relative to the stand-offs so that the washer assembly **63** which is connected to the shaft **67** may be pivoted about the pin **78** upwardly or downwardly from the horizontal position. This will allow one type of correction.

A second manner of correcting the inductance characteristic is to loosen the set screw **71** so that the end plates **68** and **69** may be loosened and the upper surface of the spacer washers adjusted to form a desired curve. After the desired form is obtained, the end washers **68** and **69** may be tightened. The particular shape of the upper surface of the washer assembly may be obtained empirically but certain relationships are discovered after a number of attempts have been made.

Thus, in Figure 2 the washer assembly has been adjusted to correct for undesired errors in a particular coil. It is to be noted that the shaft **67** is pivoted upwardly about the pin **78** and that the washer assembly **63** has been adjusted so that it has an irregular curve along its top surface upon which the point **62** of the arm **39** rides. Once the curve and angle of the washer assembly and the shaft **67** are obtained, any desired number of coils may be wound with the assurance that they will all be uniform and correct. In mass production runs, once the correct shape of the washer assembly and angle of the shaft **67** is obtained, they may be locked in place and the remaining coils made.

Although this invention relates in general to a corrector mechanism for a coil winding machine, it is to be understood that the principles disclosed herein are applicable to corrector mechanism of other machines.

Although it 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. A corrector unit for a coil winding machine comprising, a housing, a longitudinal shaft rotatably supported in said housing and adapted to receive a coil form, a slide arm supported by said housing for motion parallel to said shaft, a cam rotatably supported by said housing and engaging said slide arm to move it relative to the housing, said cam rotating as a function of the rotation of said longitudinal shaft, a follow arm pivotally supported on one end of said slide arm, a wire guide slideably mounted on said slide arm in engagement with said follow arm, a cam member having a profile of adjustable configuration in a plane parallel to said shaft, said cam member being fixedly mounted on said housing, one end of said follow arm engaging said cam member, and said cam member varying the advance of said wire guide as a function of said guide's advance, whereby a desired correction of the advance of said wire guide is introduced.

2. Apparatus according to claim 1 wherein said cam member comprises a plurality of elongated washers formed with elongated openings, a shaft extending through said openings in said washers, and means for clamping said washers to said shaft to form a rigid assembly.

3. A corrector mechanism for a coil winding machine having a slide arm and means for rotatably supporting a coil form comprising, a follow arm pivotally supported by one end of said slide arm, a wire guide positioned by said follow arm, a cam assembly engaging said follow arm, said cam assembly varying the position of said wire guide as a function of the position of said wire guide, said cam assembly comprising a plurality of washers, a square shaft passing through said plurality of washers, said square shaft pivotally supported by said coil winding machine, and said washer assembly adjustable so that the washers may be moved relative to each other, whereby said cam assembly introduces a desired correction into the motion of said wire guide.

4. A corrector mechanism for a coil winding machine wherein said coil winding machine comprises a base plate, a housing supported on said base plate, a first shaft rotatably supported by said housing adapted to receive a coil form, a slide arm slideably supported by said housing, a second shaft rotatably supported transversely of said first shaft by said housing, means coupling said second shaft to said first shaft, a cam attached to said second shaft engaging said slide arm to move it relative to the housing, a follow arm pivotally supported on one end of said slide arm, a wire guide slideably mounted on said slideable arm and positioned by said follow arm, a stand-off attached to said base plate, a cam assembly mounted on said stand-off engaging one end of said follow arm to compensate for inaccuracies in the cam, said cam assembly comprising a pivotal arm supported by said stand-off, means for locking said pivotal arm in a fixed angular position to said stand-off, a plurality of washers formed with elongated openings mounted on said pivotal arm, and means for adjusting the relative positions of said washers on said pivotal arm.

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