Dec. 13, 1966 P. J. POST 3,291,402

WIPING CONTACT FOR A TORODIAL CORE WINDER

Filed Sept. 10, 1964

FIG. 1

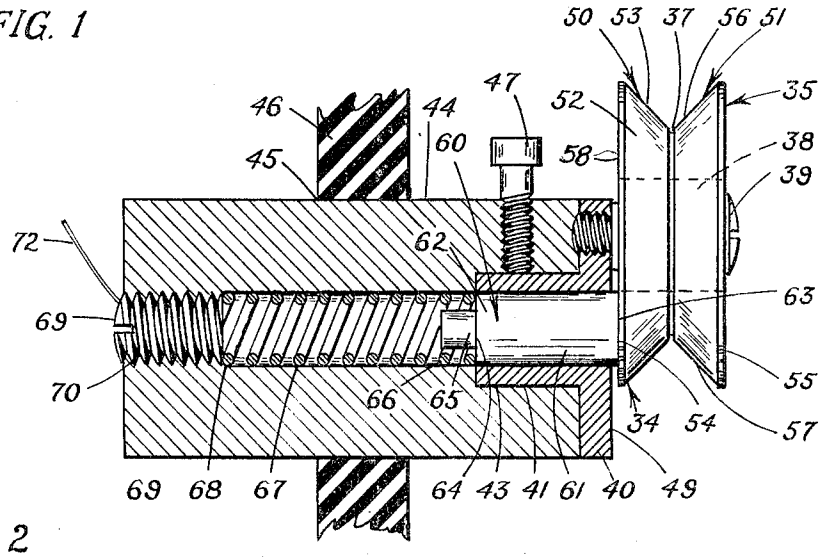
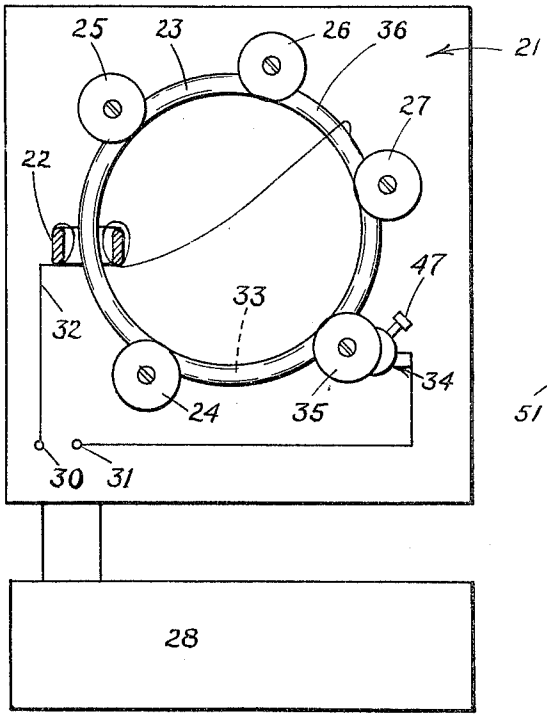


FIG. 2



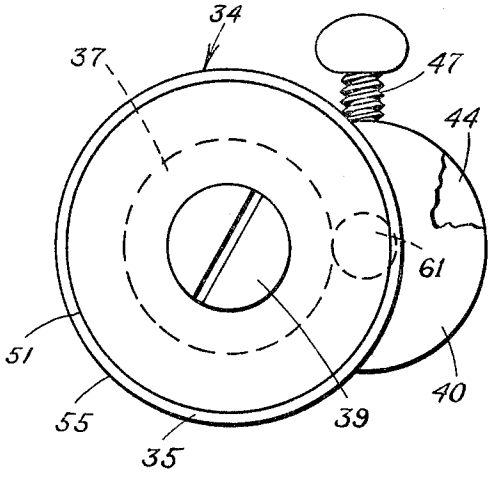


FIG. 3

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3,291,402

Patented Dec. 13, 1966

3,291,402
WIPING CONTACT FOR A TOROIDAL CORE WINDER

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Filed Sept. 10, 1964, Ser. No. 395,495
8 Claims. (Cl. 242—4)

This invention relates to an improved wiping contact especially for use in toroidal core winders of the automatic, impedance matching type.

A winder of this type is disclosed in U.S. Patent 2,697,559 to Scarce of Dec. 21, 1954 and in general includes an electrically conductive, annular, wire carrying shuttle interlinked in the core to be wound and rotatably supported and driven by a plurality of V-groove sheaves. The automatic impedance matching device includes two terminals, one connected to the start lead of the coil to be wound on the core and the other connected by a wiping contact to the shuttle.

In devices of this type, the strand being wound is often fragile and is usually discharged from the exterior peripheral slot of the shuttle. The wiping contact must rotate freely without substantial friction and must maintain a good electrical connection at all times despite fatigue of the spring, wear of the contact faces and impact of any sliders or guides on the shuttle.

It is an object of the invention, therefore, to provide an improved wiping contact for a wire carrying, annular shuttle which will not heat up in use to the extent of binding of the parts.

Another object of the invention is to provide a wiping contact formed by one of the V-groove supporting sheaves of a wire-carrying shuttle, the sheave on one side being formed of relatively hard, electrically conducting metal and on the other side being formed of softer non-conducting material.

A further object of the invention is to provide a rugged, long lasting trouble free wiping contact including a spring loaded brush engaging the side face of a sheave and means for adjusting the pressure of the spring.

Other objects and advantages of the invention will be apparent from the claims, the description of the drawing and from the drawing in which:

FIG. 1 is a side elevation, in half section of the improved wiping contact of the invention,

FIG. 2 is a diagrammatic view on a reduced scale, showing the connection of the core, coil and shuttle to the terminals leading to an inductance measuring device, and

FIG. 3 is a front elevation of the device shown in FIG. 1, but with the flange, sleeve bearing and sheave turned to a different angular position.

In FIGURE 2 a conventional toroidal core winder **21** is illustrated diagrammatically, there being the usual clamp mechanism, not shown, for supporting the toroidal core **22** to be wound, the usual annular, wire carrying, electrically conducting shuttle **23** interlinked in the core and the usual V-groove shuttle supporting sheaves, or pulleys, **24**, **25**, **26** and **27**. The idler and drive sheaves are electrically insulated in order not to interfere with the conventional inductance measuring device indicated generally at **28**. The terminals **30** and **31** lead to the inductance measuring device **28**, the start lead **32**, of the coil **33** within the shuttle, being connected to terminal **30** and the improved wiping contact means **34**, of the invention, being connected to terminal **31**. As thus far described the device is similar to that shown in the said U.S. Patent 2,697,559, and improves thereover in the design of the wiping contact **34** while otherwise operating in the manner of the mechanism of the patent.

As best shown in FIGURES 1 and 3, the wiping contact means **34** includes an idler sheave **35** substantially identical in V-groove configuration to the sheaves **24**, **25**, **26** and **27**, the exterior face **36** of shuttle **23** riding in the V-groove **37**. The sheave **35** is freely rotatable on suitable ball bearings **38**, supported on a machine screw **39** threaded in the flange **40** which is integral with a hollow sleeve bearing **41**. Sleeve bearing **41** is preferably a hollow cylinder angularly movable in recess **43** in a cylindrical housing **44**, and the housing fits within a suitable recess **45** in the non-conductive face plate **46** of the winder. A set screw **47** permits the flange to be turned to various angular positions as desired, thereby adjusting the offset sheave to a variety of shuttle contacting positions around the axis of the sleeve **41**. The outer end **49** of sleeve **41** is open and positioned alongside, and proximate the inner face of sheave **35**.

Preferably sheave **35** is formed of two truncated conical halves **50** and **51**, the half **50** being formed of beryllium copper of about 95 B Rockwell in hardness, indicated at **52**, and having the inclined, shuttle contacting face **53** and the brush contact face **54** which is normal to the axis of rotation of the sheave. The other half **51** of the sheave **35**, includes at least the outer annular peripheral portion **55**, which as shown is a lining, formed of a relatively softer material **56**, preferably neoprene, having a hardness of about 70–75 durometer. Thus the inclined face **57** of the half **51** is hard enough so that it will not wear down unduly but soft enough so that it will not damage the wire of coil **33**. While the entire half **50** is shown as of the material **52**, the outer annular, peripheral, portion **58** thereof, corresponding to the portion **55** of half **51**, could be of the material **52** and the inner portion of another material. It will be apparent that the exterior of the conductive shuttle **23**, or the interior thereof if support were from inside the shuttle, which is in intimate rolling contact with the inclined face **53** of the half **50** at all times will electrically connect the core, coil and shuttle to the brush contact face **54**.

The spring loaded brush means **60**, of the wiping contact means **34**, includes a brush **61** slidably axially within the hollow sleeve **41** along a path normal to the path of rotation of sheave **35** and in parallelism with the axis of rotation of the sheave defined by the screw **39**. Brush **61** is preferably a solid cylinder of silver impregnated carbon material **62**, which is electrically conducting, the flat end face **63** of the brush being alongside the path of the sheave and proximate the periphery thereof so as to engage the brush contact face **54**. The other end face **64** of brush **61** includes a neck **65** of reduced diameter, encircled by one end **66** of a coil spring **67**, of electrically conducting copper, while the opposite end **68** of spring **67** abuts on a brass adjusting screw **69** threaded in the threads **70** of housing **44**.

The coil spring **67** thus spring loads the brush **61** toward the adjacent face **54** of the sheave and maintains continuous electric contact therewith despite wear and avoids the possibility of frictional heat causing any binding of the parts. By means of adjusting screw **69**, the pressure of the spring can be increased or decreased as desired and any wear on the flat face **63** can be compensated by turning the screw. The screw **69** is connected by the conductor **72** to the terminal **31** to complete the circuit from terminal **30**, the core **22**, coil **33**, shuttle **23**, portion **50** of sheave **35**, brush **61**, spring **67** and adjusting screw **69**.

I claim:

1. In combination with a toroidal core winder of the type having an annular, electrically conducting, wire carrying shuttle rotatably supported on a plurality of rotatable, V-groove sheaves, said shuttle being interlinked in a core, and having an inductance measuring device with

two terminals, one connected to the start lead of the coil to be wound on the shuttle and the other connected to a wiping contact on said shuttle;

improved wiping contact means comprising:

one of said V-groove sheaves having at least an annular peripheral portion on one side thereof formed of electrically conducting material, said conductive portion having an inclined face in engagement with the exterior of said shuttle and a brush-contact face normal to the axis of rotation of said sheave, and

spring loaded brush means of electrically conducting material mounted alongside the path of said annular, peripheral portion of said sheave, and electrically connected to said other terminal, said brush means including an end face bearing against said brush-contact face of said sheave;

said electrically conducting portion of said sheave and said brush means connecting the coil wound on said shuttle and core into the circuit of said inductance measuring device throughout the entire winding operation of said winder.

2. A combination as specified in claim **1** wherein:

said sheave is formed of two truncated conical halves, one said half being entirely of relatively hard, electrically conducting metal, with the outer portion constituting said annular peripheral portion, and the other half being of relatively soft, yieldable, non-electrically conducting material.

3. A combination as specified in claim **1** wherein:

said sheave is formed of two truncated conical halves;

one said half being formed of beryllium copper of 95 B Rockwell hardness, said annular peripheral portion constituting the outer portion of said half,

and the other said half being formed of neoprene with a 70–75 durometer hardness.

4. A combination as specified in claim **1** wherein:

said annular peripheral portion is of beryllium copper, and

said brush means is of silver impregnated carbon.

5. A combination as specified in claim **1** wherein:

said spring loaded brush means comprises:

an insulated housing;

a hollow sleeve bearing within said housing, one open end thereof being proximate the brush-contact face of said sheave;

a brush of solid, electrically conducting material axially slidable within said sleeve and having a flat end face adapted to engage said brush-contact face, and

a coil spring within said housing and engaging the other end face of said brush for urging said brush toward said brush-contact face.

6. A combination as specified in claim **5** plus:

threaded adjustment means in said housing, cooperable with said coil spring for adjusting the pressure thereof against said brush.

7. A combination as specified in claim **1** plus:

at least an annular peripheral portion on the other side of said sheave formed of neoprene, said neoprene portion having an inclined face in engagement with the exterior of said shuttle, and

said neoprene having a hardness of about 70–75 durometer for avoiding damage to the wire wound on said shuttle.

8. An improved wiping contact for the shuttle of a toroidal core winder of the automatic impedance matching type said contact comprising:

a V-groove sheave, supporting said shuttle, the inner, inclined shuttle contacting portion thereof being formed of beryllium copper and the outer inclined shuttle contacting portion thereof being formed of neoprene;

a solid cylindrical brush, of silver impregnated carbon, mounted for sliding movement in a path normal to the path of rotation of said sheave, said brush having an end face adapted to engage the adjacent face of said inner beryllium copper portion, and

adjustable spring means continuously urging said brush toward said sheave for maintaining contact therewith despite wear.

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