July 10, 1962 D. W. LAVIANA ET AL 3,043,922

ELECTRIC TRANSMITTER

Filed May 5, 1960

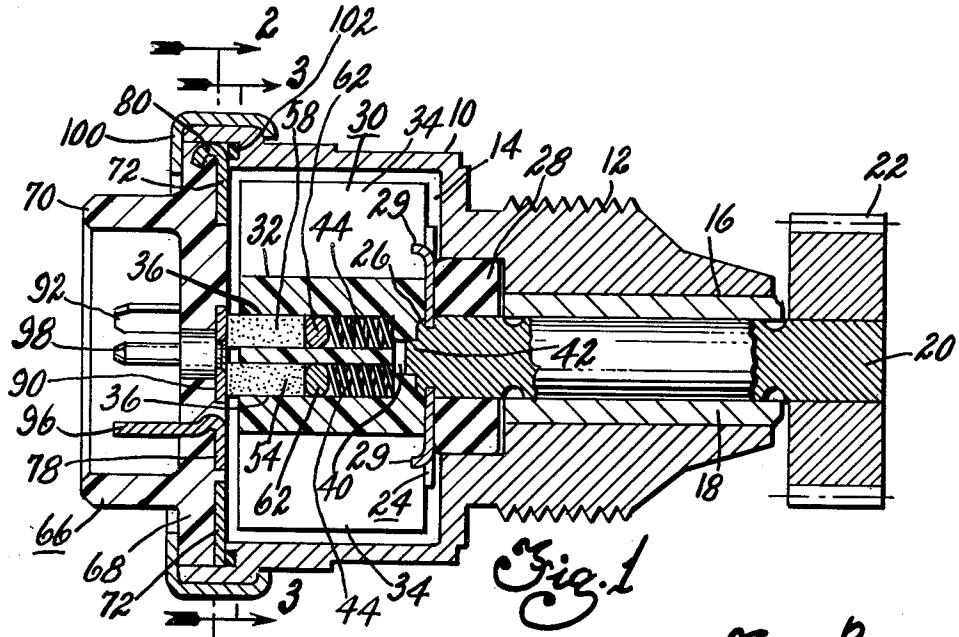


Fig. 1

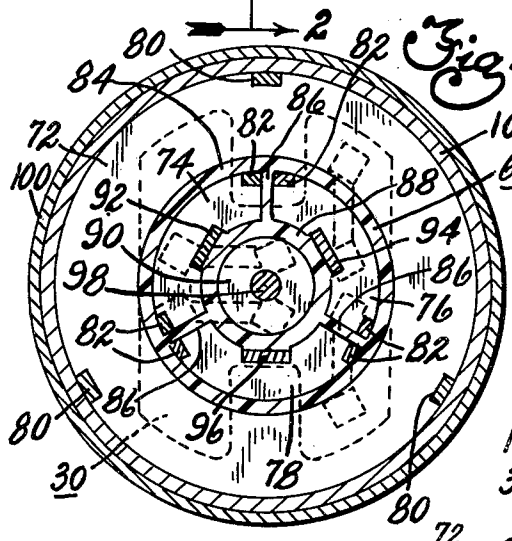


Fig. 2

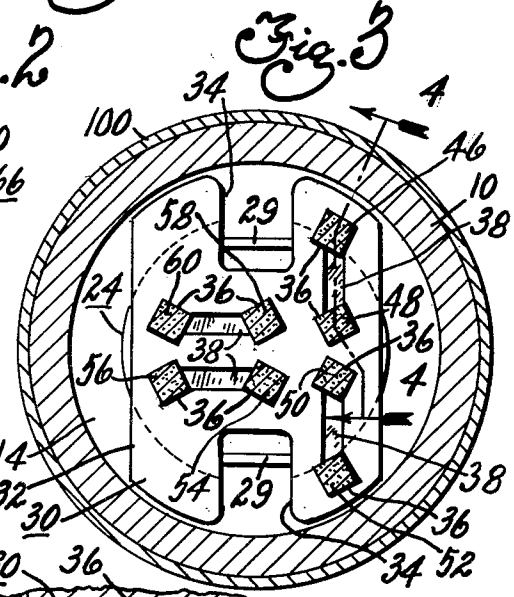


Fig. 3

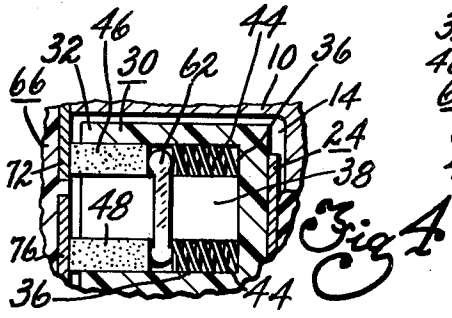


Fig. 4

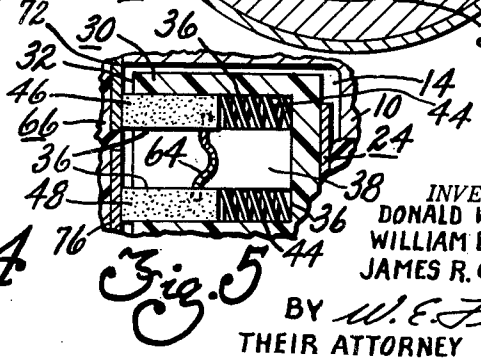


Fig. 5

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United States Patent Office 3,043,922 Patented July 10, 1962

3,043,922

ELECTRIC TRANSMITTER

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Filed May 5, 1960, Ser. No. 27,064
5 Claims. (Cl. 200—24)

This invention pertains to electric inverters, and particularly to an improved transmitter assembly for converting direct current to three phase alternating current.

In copending application Serial No. 857,012, filed December 3, 1959, in the name of William E. Fritz et al. and assigned to the assignee of this invention, an electric speedometer drive is disclosed including a transmitter and a receiver. The transmitter converts direct current to three phase alternating current having a frequency proportional to vehicle speed. The alternating current signal developed by the transmitter is used to excite the phase windings of a receiver having a rotor which is driven at a speed directly proportional to the frequency of the alternating current signal. The present invention relates to an improved transmitter construction for use in an electric speedometer drive of the aforesaid type. Accordingly, among our objects are the provision of an improved transmitter construction for converting direct current to three phase alternating current; the further provision of a transmitter including an improved brush drum and means for imparting rotation thereto; and the still further provision of a transmitter including an improved contact assembly wherein the commutator segments are mechanically interlocked with the dielectric material.

The aforementioned and other objects are accomplished in the present invention by designing the brush drum so that the brushes project from only one side thereof for engagement with the commutator segments and the power supply slip rings. Specifically, the improved transmitter comprises a housing having a cup-shaped recess therein coaxial with a shaft receiving bore. A drive shaft is supported by a bushing in the bore, the drive shaft being attached to a drive plate disposed within the cup-shaped recess. The brush drum is molded of an insulating material, such as phenolic, and has a pair of notches adapted to receive tangs on the drive plate for coupling the drive plate to the brush drum. In addition, the brush drum is formed with a cylindrical recess for receiving the end of the drive shaft whereby the brush drum is coaxially arranged with respect to the drive shaft.

The brush drum is molded with eight brush receiving pockets, or recesses, arranged in pairs, each pair being connected by a groove. Each pocket receives a spring and a brush, each pair of brushes being connected by a suitable jumper disposed in the slot between each pocket of each pair.

The contact assembly comprises a disc of molded insulating material having an axially extending annular flange, the slip rings and commutator segments being molded in situ with the insulating material. Accordingly, the commutator segments have a plurality of hooks which are mechanically interlocked with the dielectric material. The spaces between the arcuate commutator segments, and between the segments and the slip rings are filled with an insulating material.

When the contact assembly is assembled with the housing, the outer slip ring engages the housing and thus completes an electrical ground connection. The three commutator segments and the center slip ring are connected to terminals disposed within the annular flange of the commutator body. The disc is held in assembled

relation with the housing by a ring, the end of which is spun over the end of the housing.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a longitudinal view, partly in section and partly in elevation, depicting the improved transmitter construction.

FIGURES 2 and 3 are sectional views taken along lines 2—2 and 3—3, respectively, of FIGURE 1.

FIGURE 4 is a fragmentary sectional view taken along line 4—4 of FIGURE 3 illustrating one embodiment of a brush jumper.

FIGURE 5 is a view similar to FIGURE 4 illustrating a modified form of the brush jumper.

With reference to FIGURES 1 through 3, the transmitter comprises a die cast housing **10** having an externally threaded mounting portion **12**, a cup-shaped recess **14** and a through bore **16**. The cup-shaped recess **14** is coaxial with the through bore **16**, and a bushing **18** is press fitted in the bore **16**. A drive shaft **20** is journalled in the bushing **18**, the drive shaft having a pinion **22** attached to one end and a drive plate **24** staked at **26** to the other end thereof. An oil seal **28** is disposed between the plate **24** and the inner end of the bushing **18**. As clearly seen in FIGURE 1, the plate **24** has a pair of diametrically opposed axially extending tangs **29**.

A brush drum assembly **30** is coaxially arranged within the cup-shaped recess **14**. The brush drum assembly **30** comprises a generally H-shaped body of insulating material **32** having notches **34** for receiving the tangs **29** on the drive plate **24**. The body **32** is molded with eight axially extending substantially square bushing receiving pockets, or cavities **36** which are arranged in pairs connected by axially extending grooves **38**. In addition, the body **32** is formed with a cylindrical recess **40** adapted to receive the reduced diameter end **42** on the shaft **20**.

Each pocket **36** receives a coil spring **44** and a brush, the brushes being indicated by numerals **46**, **48**, **50**, **52**, **54**, **56**, **58** and **60**. The brushes **46** and **48** constitute one pair, and are connected by either a metallic jumper **62** as indicated in FIGURE 4 or a pigtail jumper **64** as indicated in FIGURE 5. The jumpers **62** or **64** extend through the grooves **38** connecting the pockets of each pair. The other pairs of brushes comprise brushes **50** and **52**; **54** and **56**; and **58** and **60**.

The open end of the cup-shaped recess **14** in the housing **10** is closed by a contact assembly **66** comprising a disc **68** of insulating material having an integral axially projecting annular flange **70**. An outer metallic slip ring **72** and three arcuate commutator segments **74**, **76** and **78** are molded in situ with the insulating material of the disc **68**. The slip ring **72** is formed with three circumferentially spaced hooks **80**, and each of the segments **74**, **76** and **78** is formed with a pair of circumferentially spaced hooks **82** which are interlocked with the dielectric material. The molded insulating material comprising the disc **68** completely fills the annular space **84** between the slip rings **72** and the segments **74**, **76** and **78**, as well as the spaces **86** between the segments and the annular space **88** between the segments and the center slip ring **90**.

The segments **74**, **76** and **78** are formed with integral terminal portions **92**, **94** and **96** which extend into the space defined by the annular flange **70**. The center slip ring **90** is attached to a central terminal stud **98**.

The contact assembly **66** is held in assembled rela-

tion with the housing **10** by a ring **100**, the end of which is spun over a flange on the housing. A weather seal **102** is interposed between the edge of the contact assembly **66** and the housing **10**. The outer slip ring **72** engages the housing **10** and thus completes the ground circuit. The terminal stud **98** is connected to the opposite terminal of a direct current power supply, such as a vehicle battery, and accordingly brushes **54** and **58** which engage the center slip ring **90** and are connected to one terminal of the direct current power supply while brushes **46** and **52** which engage the slip ring **72** are connected to the other terminal of the direct current power supply. Since brush **46** is connected to brush **48**, and brush **52** is connected to brush **50**, the brushes **48** and **50** are electrically grounded. Moreover, brushes **56** and **60** are connected to the other terminal of the power supply so that upon rotation of the brush drum **30** by the drive plate **24** the direct current supply voltage will be converted to three phase alternating current having a frequency proportional to the rotative speed of the drum assembly **30**. The brushes **48** and **50**, and **56** and **60** engage successive commutator segments **74**, **76** and **78** during relative rotation between the brush drum assembly **30** and the contact assembly **66**. Moreover if desired, the specific resistance of the brushes **56** and **60** may vary, as may the specific resistance of the brushes **48** and **50** so that the staircase wave forms derived from the commutator segments approximate sine waves.

While the embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A transmitter for an electric speedometer drive including, a housing having a cup-shaped recess, a rotatable brush drum assembly coaxially disposed within said recess and having a pair of diametrically opposed radially extending slots, a drive shaft rotatably supported in said housing, a drive plate connected to said drive shaft and having a pair of axially extending tangs snugly received in the notches of said brush drum assembly, a stationary contact assembly attached to said housing having a plurality of circumferentially spaced commutator segments, an outer coaxial slip ring and a center coaxial slip ring thereon, first brush means carried by said brush assembly engaging said outer slip ring, second

brush means carried by said brush drum assembly engaging said center slip ring, and third brush means carried by said brush drum assembly and engageable with said segments, certain of said third brush means being electrically connected to the first brush means and other of said third brush means being electrically connected to the second brush means.

2. A transmitter for an electric speedometer drive including, a housing having a cup-shaped recess, a rotatable brush drum coaxially disposed within said recess, said brush drum having a plurality of pairs of axially extending polygonal cavities therein and an axially extending groove connecting the cavities of each pair, a drive shaft rotatably supported in said housing and connected to said brush drum, a stationary contact assembly attached to said housing having a plurality of circumferentially spaced commutator segments, an outer coaxial slip ring and a center coaxial slip ring thereon, a spring biased brush slidably mounted within each cavity of said brush drum, and means electrically interconnecting the brushes of each pair.

3. The transmitter set forth in claim 2 wherein the electrical means interconnecting the brushes of each pair comprise a metallic brush jumper disposed within the groove connecting the cavities of each pair.

4. The transmitter set forth in claim 2 wherein the means electrically interconnecting the brushes of each pair comprise a pigtail extending through said groove and having its ends attached to the brushes of each pair.

5. The transmitter set forth in claim 2 wherein the said housing is composed of electrically conductive material, and wherein said outer slip ring is electrically connected thereto.

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