July 21, 1970 D. J. RUSSO 3,521,095

MOTORIZED POTENTIOMETER

Filed July 1, 1968 2 Sheets-Sheet 1

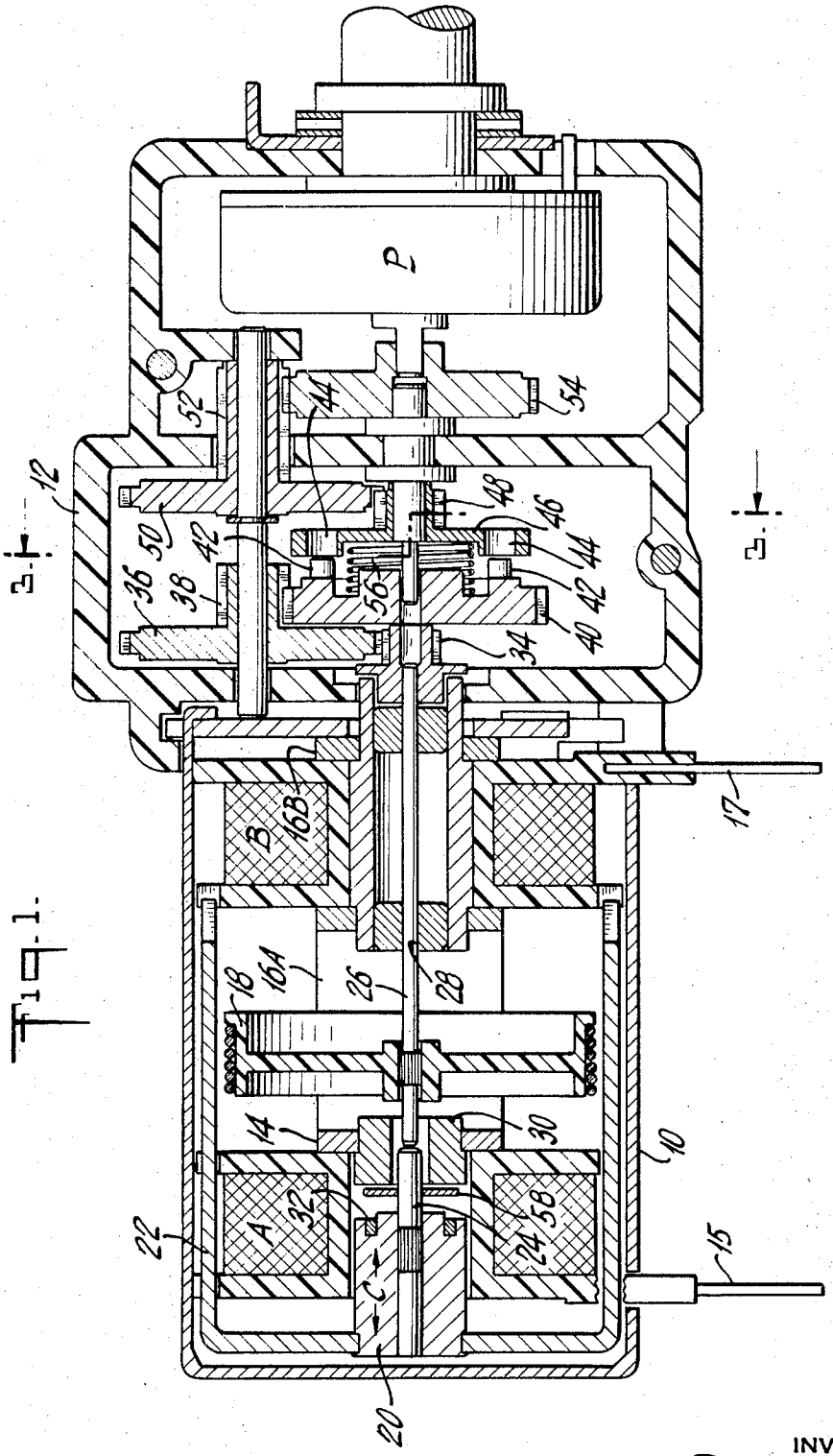


Fig. 1.

INVENTOR
DOMINIC J. RUSSO
BY Nolte & Nolte
ATTORNEYS

July 21, 1970 D. J. RUSSO 3,521,095

MOTORIZED POTENTIOMETER

Filed July 1, 1968 2 Sheets-Sheet 2

Fig. 2.

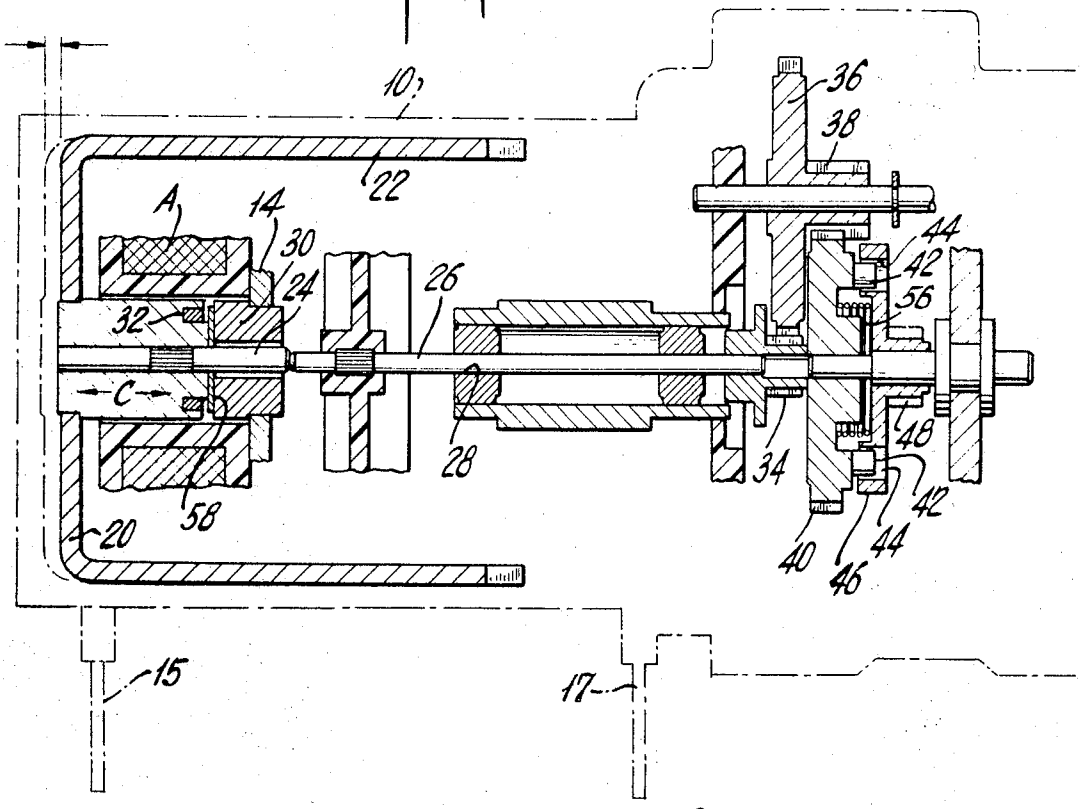
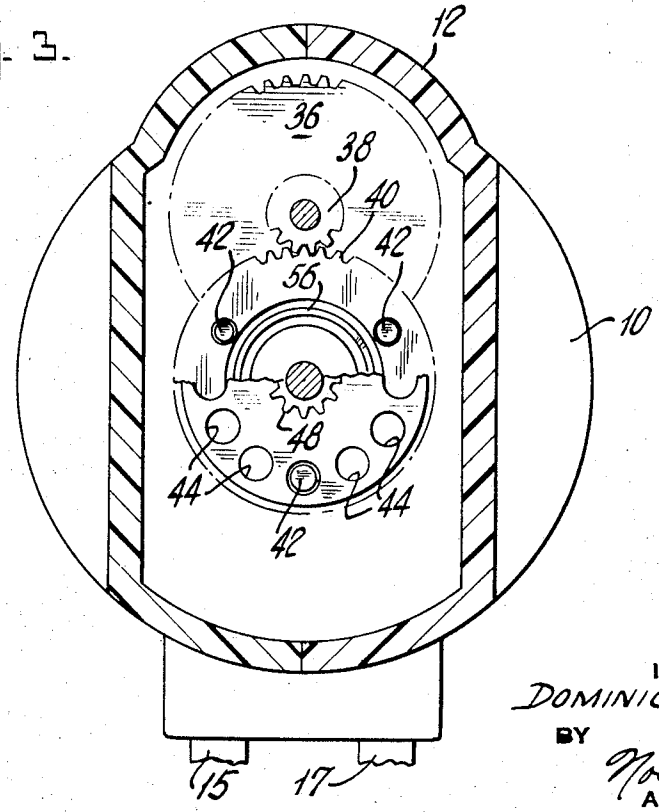


Fig. 3.



INVENTOR
DOMINIC J. RUSSO
BY
Nolte & Nolte
ATTORNEYS

United States Patent Office 3,521,095 Patented July 21, 1970

3,521,095

MOTORIZED POTENTIOMETER

Dominic J. Russo, Yankton, S. Dak., assignor to Dale Electronics, Inc., Columbus, Nebr., a corporation of Nebraska

Filed July 1, 1968, Ser. No. 741,554
Int. Cl. H02k 7/10
U.S. Cl. 310—83 4 Claims

ABSTRACT OF THE DISCLOSURE

A motor-potentiometer combination in which the motor drive can be disconnected from the potentiometer when manual operation of the potentiometer is desired. The magnetic core of the rear pole piece assembly is integral and functions as a solenoid plunger and when electrically actuated moves the normally disconnected motor gear train and potentiometer gear train into engagement. The core has an elongated non-magnetic extension. The latter together with the magnetic core and rotor shaft are mounted along the central axis of the housing.

This invention relates to a motorized potentiometer in which the motor engages the gear train only when the motor is energized. When the motor is deenergized the potentiometer is free of the motor and its gear train and is adaptable for manual adjustment.

It is an object of the present invention to form the stator and a portion of the core piece into one movable part to permit movement within the fixed stator, and thereby utilize the core as a solenoid plunger to slide a pinion of the motor into driving engagement with the potentiometer. When the core of the pole piece is moved in the opposite direction the pinion of the motor is withdrawn from driving engagement with the potentiometer, and the latter may be adjusted manually.

Another object of the present invention is to provide the solenoid plunger with a metallic ring, preferably of copper, to create a shaded pole effect which results in a more efficient motor.

It is still another object of the present invention to provide a motorized potentiometer having fewer parts than previous constructions, thereby making the same relatively inexpensive to manufacture and having a higher degree of reliability.

It is a further object of the present invention to have a complete magnetic path between the core and pole pieces. This construction reduces the magnetic losses in the motor thereby making the motor more powerful and permitting the motor to run cooler.

The invention is illustrated by way of example in the accompanying drawings which form part of the application and in which:

FIG. 1 is a cross-sectional view of motor-potentiometer combination constructed in accordance with the teachings of the present invention; and with the motor gear train disengaged from the potentiometer gear train;

FIG. 2 is a cross-sectional view of the motor-potentiometer combination similar to the view shown in FIG. 1, but with certain parts removed, and with the motor gear train engaged with the potentiometer gear train; and

FIG. 3 is a transverse section taken along the lines 3—3 of FIG. 1.

Referring to the drawings, the present motor-potentiometer combination comprises a motor housing **10** and a potentiometer and gear train casing **12** which are co-extensive. Mounted in the motor housing **10** are stators **14** and **16A** and **16B** and a rotor **18**. The coils of the stators **14** and **16** are shown as A and B respectively. In addition, electrical terminals for the stators A and B are designated by reference numerals **15** and **17** respectively. A cylindrical magnetic core **20** has a yoke portion **22** attached to it and forms the rear pole piece assembly. Core **20** is formed in a manner to permit it to move within the fixed stator **14** parallel to the longitudinal axis of the motor and in the directions of the double-headed arrow C. The cylindrical magnetic core which functions in the manner of a solenoid plunger is provided with a non-magnetic pin-like extension **24** which also extends parallel to the longitudinal axis of the motor. Mounted co-axially with non-magnetic extension **24** is the slidable rotor shaft **26**. The latter also extends through a bore **28** in the stator **16** and is freely shiftable therein. An abutment member **30** is located in the center of the two poles of the stator **14** and part thereof. Mounted on the non-magnetic extension **24** between the slidable magnetic core **20** and the abutment member **30** is a non-magnetic, anti-shick washer **58**. A metallic ring **32** such as copper creates a shaded pole effect for the motor, and thereby makes the same a more powerful, smoother running motor. Attached to the end of the rotor shaft **26** remote from extension **24** are motor gears **34**, **36**, **38** and **40**. Gear **40** has coupling pins **42** projecting from a front surface thereof which are adapted to be engaged in adjacent openings **44** arranged circularly on a part **46** of the gear **48** of the gear train of the potentiometer P. The potentiometer gear train also includes gears **50**, **52** and **54** respectively.

As clearly seen in FIGS. 1 and 2, the motor is disconnected from the potentiometer P in FIG. 1 and connected to the potentiometer as shown in FIG. 2. In the latter event, the cylindrical magnetic core **20** has slid to the right by magnetic flux produced upon the application of voltages to the coil A of the stator **14**. When this occurs, the non-magnetic extension **24** pushes the rotor shaft **26** also to the right causing the pins **42** of the gear **40** to seat in the adjacent holes **44** of part **46** of gear **48** in the potentiometer gear train. Thus, the motor is drivingly connected to the potentiometer P. A spring **56** engages at one end the part **46** and engages at the other end the gear **42**. Therefore, the spring **56** normally urges the rotor shaft **26**, the extension **24** and the cylindrical magnetic core **20** to the left whereby the assembly normally assumes the position shown in FIG. 1 with the motor and potentiometer P disengaged.

It should be noted that the present motor-potentiometer combination has the desirable attribute of permitting the potentiometer to be manually operated without the drag of the rotor shaft and the motor gear train. In addition, the present construction, having fewer parts than other known structures, is less expensive to manufacture and more reliable in operation.

What is claimed is:

1. A motor-potentiometer combination, wherein both said motor and potentiometer have associated gear trains comprising; a housing, a rotor and a stator mounted in said housing; a rear pole piece assembly in said housing having a core; an elongated non-magnetic extension mounted on said core substantially co-axially therewith and slidably movable with said core along the longitudinal axis of said housing when said stator is electrically actuated; a rotor shaft mounted for sliding movement in said housing, said elongated extension and rotor shaft abutting each other in an end-to-end relationship; a pinion on the other end of said rotor shaft having means for drivingly engaging the gear train associated with said potentiometer when said core is moved in one direction and disengaging said gear train associated with said potentiometer when said core is moved in the opposite direction; said magnetic core of the rear pole piece

assembly, said elongated non-magnetic extension, and said rotor shaft being mounted along the central axis of said housing; and a spring positioned between said potentiometer gear train and said motor gear train normally urging the means for drivingly engaging the potentiometer gear train out of engagement with the latter.

2. A motor-potentiometer combination as claimed in claim 1 further comprising a metallic ring mounted on the core of said rear pole piece and adjacent to said stator for creating a shaded pole effect for said motor.

3. A motor-potentiometer combination as claimed in claim 1 wherein said core and rear pole piece are integral.

4. A motor-potentiometer combination as claimed in claim 1 wherein said rear pole piece assembly is provided with an attached rear pole piece and core having a complete magnetic path between said core and said pole pieces.

References Cited

UNITED STATES PATENTS

1,956,041	4/1934	Naul	310—78
2,518,009	8/1950	Hess	310—78
3,054,304	9/1962	Jursik	310—78
3,241,385	3/1966	Tomaro	310—78
3,261,999	7/1966	Gallagher	310—172

MILTON O. HIRSHFIELD, Primary Examiner

R. SKUDY, Assistant Examiner

U.S. Cl. X.R.

310—78; 89