

Aug. 4, 1942.

W. H. TUCKER

2,291,775

MOTOR

Filed April 18, 1940

3 Sheets-Sheet 2

Fig. 3

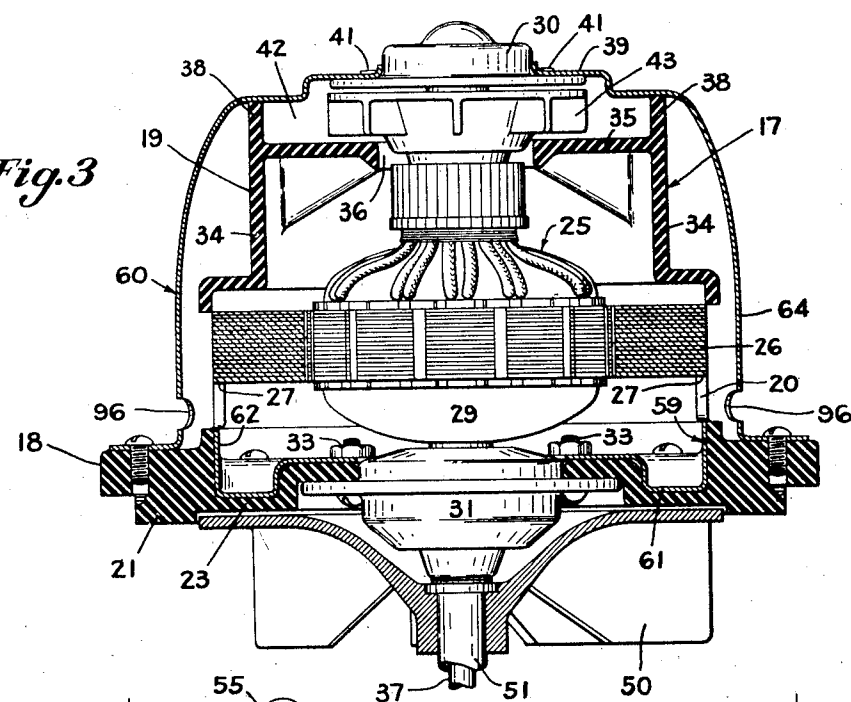
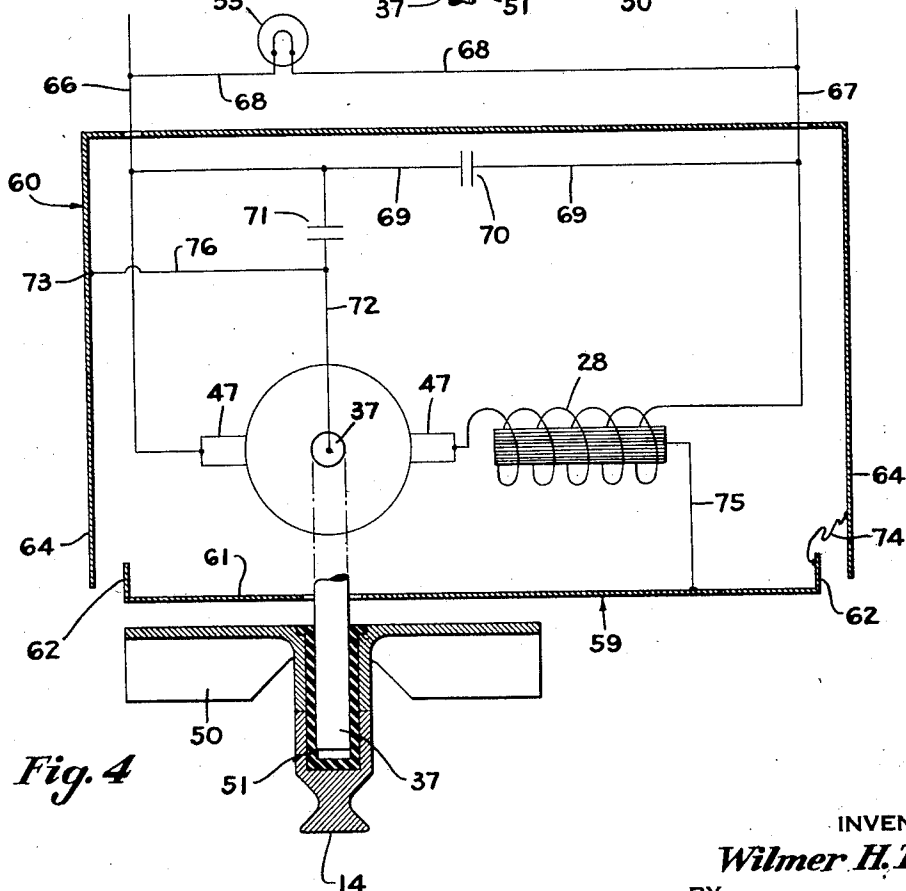


Fig. 4



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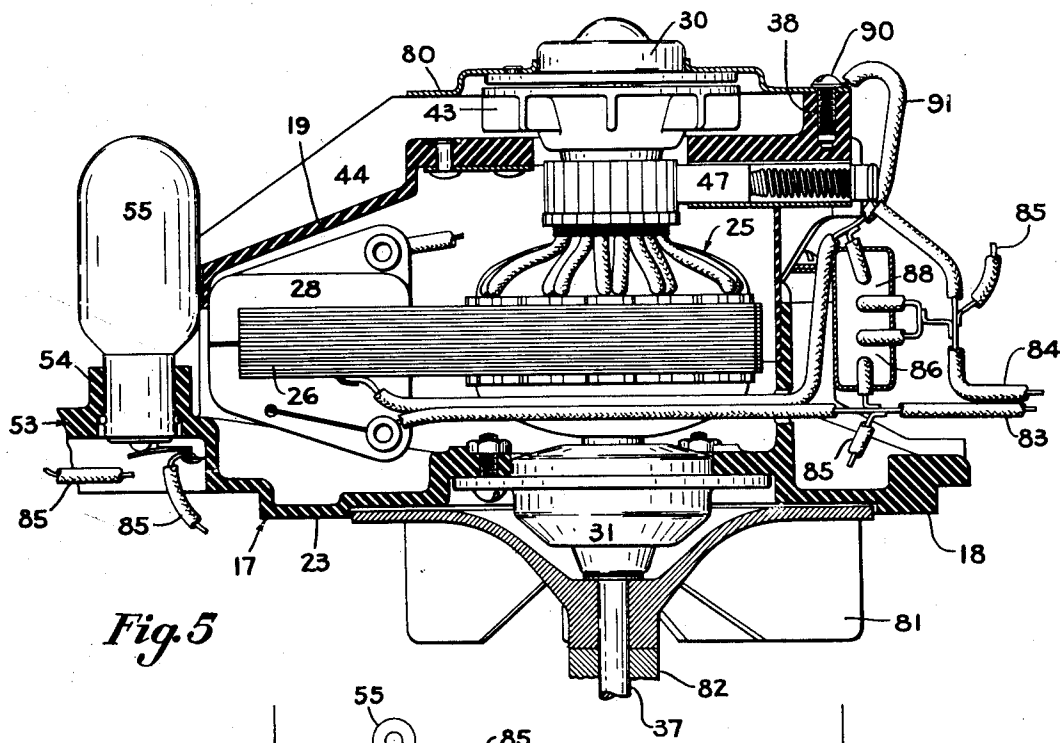


Fig.5

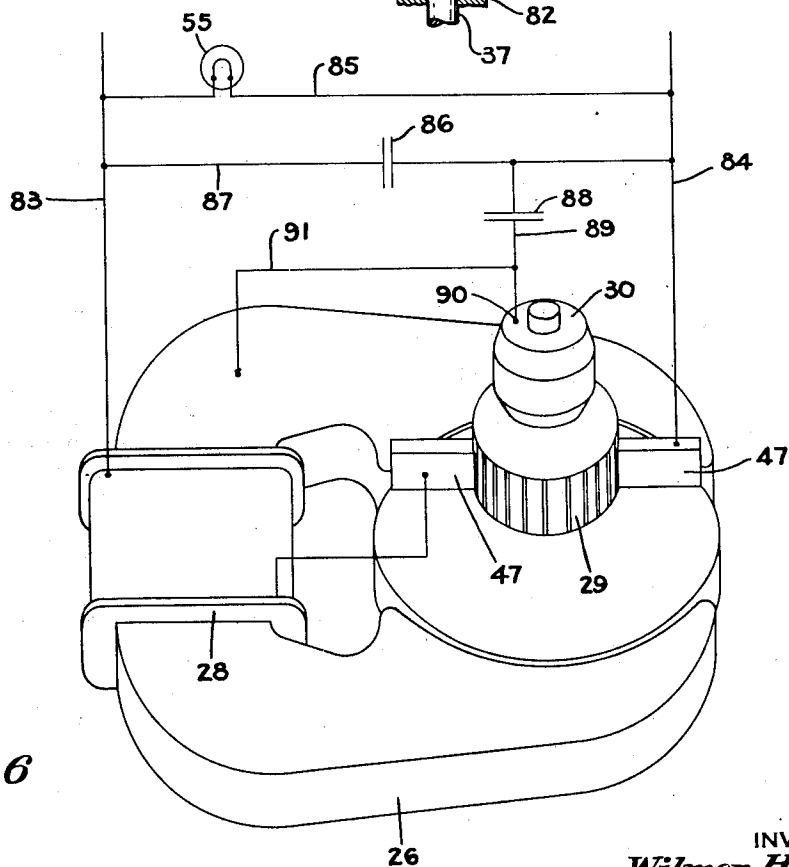


Fig. 6

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2,291,775

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16 Claims. (Cl. 172—36)

This invention relates to suction cleaners in general, and particularly to the construction thereof and circuits therefor for eliminating interference with radio reception due to operation of the suction cleaner.

It is an object of the invention to provide a new and improved suction cleaner. Another object is to provide a cleaner construction designed to incorporate special circuits for eliminating interference with radio reception. A further object is to provide a fully electric insulated cleaner construction which cooperates with circuits to prevent operation of the cleaner from interfering with radio reception. Further objects and advantages of the invention will be apparent from the specification and drawings, wherein

Figure 1 is a side elevation of a suction cleaner partly broken away to disclose details of one embodiment of the invention.

Figure 2 is a longitudinal vertical sectional view of the embodiment of the invention shown in Figure 1.

Figure 3 is a sectional view taken on line 3—3 of Figure 1.

Figure 4 is a wiring diagram of the circuits employed in Figures 1 to 3.

Figure 5 is a section of a suction cleaner showing another embodiment of the invention, and

Figure 6 is a perspective view of the motor and wiring diagram of the embodiment shown in Figure 5.

One embodiment of the invention is disclosed in Figures 1 to 4 and comprises a suction cleaner having a metallic main casing 10 provided with a nozzle 11, a fan chamber 12 communicating with an unshown passageway which exhausts into a filter bag 13 removably secured at its lower end to the main casing 10. Rotatably mounted in the nozzle 11 is an unshown agitator which is rotated by an unshown belt connected to a motor pulley 14. The cleaner is mounted on front and rear wheels 15 and is propelled by a handle 16 pivotally mounted on the main casing.

Mounted on the main casing 10 is a motor housing 17 formed in two sections 18 and 19 which are composed of electric insulating material. The lower motor housing section 18 is provided with an annular vertical side wall 20 and a bottom wall 21, the latter resting upon the metal casing 10 and is secured thereto by screws 22, and it also closes an opening in the main casing to form the complete top wall 23 of the fan chamber 12. Mounted in the lower motor housing section 18 is a motor 25 having a U-shaped field core 26 resting on shoulders 27 cut out of 55

the insulation of the motor housing side wall 20, and carried by the field core is a single field coil 28. An armature 29 is rotatably supported in upper and lower metal bearings 30 and 31, respectively, the latter being disposed in an opening in the lower wall 21 of the motor housing section 18 and is supported on the wall 21 by means of bolt and nut connections 33.

The upper motor housing section 19 is provided with a vertical side wall 34 and a top wall 35 from which an arcuate wall 38 projects integrally upwardly and supports a metal plate 39 by means of screws 40. The top motor bearing 30 is rigidly supported on the plate 39 by rivets 41. The metal plate 39, arcuate wall 38 and top wall 35 of the upper motor housing section cooperate to form a ventilating fan chamber 42 for a fan 43 mounted on the armature shaft 37 adjacent the top motor bearing. A portion of the upper motor housing section 19 is provided with a forwardly inclined air passageway 44 defined by a bottom wall 45 and a pair of spaced side walls 46 and which communicates with the ventilating fan chamber 42. A pair of motor brushes 47 are supported in casings 48 carried by the upper motor housing section 19.

Projecting forwardly of the vertical wall 20 of the lower motor housing section 18 is an integrally formed platform 53 which rests on the metal casing 10 and is provided with a socket 54 to receive an electric lamp 55 which throws light forwardly of the nozzle 11 onto the surface being cleaned.

Enclosing the motor housing is a motor casing 56 of insulating material which rests on the metal casing 10 and has a portion 57 removed to cooperate with the platform 53 to define an opening for the light rays emitted by the lamp 55. The casing 56 has depending side walls which cooperate with the upper motor housing 19 to define the ventilating air passageway 44.

A suction creating fan 50 and the motor pulley 14 are rigidly mounted on the lower end of the armature shaft 37 and are fully insulated therefrom by an insulating sleeve 51 threaded onto the armature shaft. Insulating washers 52 are also provided to fully insulate the fan 50 from the lower metallic motor bearing 31.

From the foregoing it will be apparent that the motor is completely insulated from the metal casing 10 and that the armature 29 is insulatably mounted with respect to the field core 26, by mounting the upper and lower motor bearings in the insulated motor housing 17.

Cooperating with the fully insulatably mount-

ed cleaner motor is an electrostatic shield formed of metal. This shield comprises two sections 59 and 60, the lower section 59 being disposed in the lower motor housing section 18. Shield section 59 has a bottom plate 61 that follows substantially the contour of the lower motor housing bottom plate 21 and is provided with an upstanding annular wall 62 which rests snugly against the inner surface of the vertical wall 20 of the lower motor housing section 18. A portion of the lower shield section 59 is removed to receive the lower motor bearing 31 in spaced relation and is electrically connected thereto by the nut and bolt connections 33.

The upper section 60 of the electrostatic shield is placed exteriorly of the motor housing and rests upon the arcuate top wall 38 of the top motor housing section 19 and extends forwardly as at 63 to conform to the contour of the ventilating air passageway 44 and downwardly in a depending wall, as indicated at 64. The depending wall 64 extends to a point opposite the upper periphery of the lower shield section 59 which is disposed interiorly of the motor housing section 18. It will be noted that the bearing supporting plate 39 forms part of the upper shield section 60 and the latter is electrically connected to the upper metallic bearing casing 30 by means of the rivets 41.

Cooperating with the electrostatic shield and the insulated motor are electric circuits shown in detail in Figure 4. These circuits comprise a pair of power lines 66 and 67 across which the dirt-finder lamp 55 is connected by a lead 68, and connected in series with the power lines is the motor armature by means of the motor brushes 47 and field coil 28. A condenser 70 is interposed in a lead 69 connected across the power lines 66 and 67. Another condenser 71 is interposed in a lead 72 connected at one end to the shunt lead 69 and the opposite end is electrically connected to the motor armature shaft 37. A lead 76 connects the condenser 71 and lead 72 in circuit with the shield 60, as indicated at 73. The lower shield section 59 is electrically connected to the upper shield section 60 by a lead 74 so that the lower end of the armature shaft is also electrically included in the circuit through the bearing 31 and bolt and nut connections 33. The motor field core is grounded to the shield by a lead 75. Both the condensers 70 and 71 are enclosed in a casing 95 attached to the shield 60.

In operation, if the power lead 67 is one pole of a radiator giving off interfering signals to radio receiving apparatus, the radio interfering voltages are by-passed from 67 through condensers 70 and 71 and thence to 73 to the electrostatic shield 60. Similarly if the other power lead 66 tends to become one pole for radiating radio interfering voltages and the shield 60 the other, the energy is by-passed from 66 through condenser 71 to the point 73 completing the circuit to the shield 60. If the power leads 66 and 67 tend to become the two poles of a radiator of radio interfering voltages, then the condenser 70 provides a low impedance path to by-pass the radio frequency energy.

By mounting the motor 25 in the fully insulated housing 17, the foregoing filter circuits are effective in reducing the intensity of the radio interference developed by the suction cleaner, and allows the use of simpler circuits than when the motor is mounted directly on the cleaner casing 10. Also by fully insulating the motor from the cleaner casing, it is not necessary to employ a

condenser between the motor and cleaner casing whereby a more effective radio filtering circuit can be employed because the motor is not grounded to the cleaner casing. By mounting the motor in an insulating housing the danger of shock is completely eliminated. Further, in insulating the fan from the armature shaft, capacitative coupling between the fan and the armature is reduced and thereby reduces the radio interfering voltages that the fan radiates.

During the operation of the cleaner the ventilating fan 43 draws air through the ports 96 in the motor housing 17 and upwardly around the armature and field core thence through the opening 36 into the chamber 42 and is exhausted therefrom through the passageway 44, lined by the electrostatic shield 60, and passes through the light opening to the outer atmosphere.

Another embodiment of the invention is shown in Figures 5 and 6 and comprises a motor 25 mounted in the insulated casing 17 supported on the cleaner casing 10 as in the foregoing embodiment. The upper motor bearing 30 is mounted on a plate 80 which is insulatably supported on the arcuate wall 38 of the upper motor housing section 19 by screws 90, and the lower motor bearing 31 is insulatably mounted in the lower wall 23 of the lower motor housing section 18, whereby the motor is completely insulated from the cleaner casing 10 and the armature insulated from the field core 26. The fan 81 and pulley 82 are mounted directly on to the armature shaft 37. The motor casing 56 completely encloses the motor housing 17 and dirt-finder lamp 55, as in the foregoing embodiment.

The circuit for eliminating radio interference comprises a pair of power leads 83 and 84 across which the dirt-finder lamp 55 is connected by a lead 85, and connected in series with the power lines is the motor armature by means of the motor brushes 47 and field coil 28. A condenser 86 is inserted in a lead 87 connected across the power lines 83 and 84, and a condenser 88 is inserted in a lead 89 connected at one end with the lead 87 and at its opposite end to the upper motor bearing 30, as indicated at 90, and which is insulatably mounted in the motor housing 17. The connection at 90 to the motor bearing 30 provides an electrical connection with the armature core and thence by means of its distributed capacity provides a connection to the armature winding. A lead 91 connects the field core 26 in circuit with lead 89.

It is to be understood that the protection herein applied for its not confined to the particular combinations of features or elements set out in the following claims. Protection is herein applied for for any one or more of the features or elements referred to in the following claims, or described in the foregoing specification or shown in the accompanying drawings, either independently or in combination.

I claim:

1. In a device of the character described, a metallic body, an electric motor connected in a power circuit, a housing of electric insulating material for said motor, said housing being mounted on said body to insulate the motor from said body to form a shock-proof device, said housing insulatably supporting the motor armature out of electrical connection with the motor field core, and condenser means electrically connected in circuit with said armature shaft and a power line, to prevent the operation of said device from interfering with radio reception.

2. In a device of the character described, a metallic body, an electric motor connected in power circuit, a housing of electric insulating material for said motor, said housing being mounted on said metallic body to insulate the motor from said body to form a shock-proof device, said housing insulatably supporting the motor armature out of electrical connection with the motor field core, a metallic shield insulated from said motor and said body by said housing, means connecting the motor field core in circuit with said shield, means connecting said armature shaft in circuit with said shield, and condenser means connected in circuit with said armature shaft and power line to prevent the operation of said device from interfering with radio reception.

3. In combination, an electric motor connected to a power circuit, a housing of electric insulating material enclosing said motor, a metallic shield having two parts disposed on opposite interior and exterior walls of said insulating motor housing, means connecting said two part shield electrically, means connecting the motor field core in circuit with said shield, means connecting the armature shaft in circuit with said shield, and condenser means connected in circuit with said armature shaft and shield, to prevent the operation of said motor from interfering with radio reception.

4. In combination, an electric motor connected to a power circuit, a housing of electric insulating material for said motor, said housing insulatably supporting the motor armature out of direct electrical connection with the motor field core, a metallic shield insulated from said electric motor by said housing, means connecting the armature shaft in circuit with said shield, and condenser means connected in circuit with said armature shaft and a power line, to prevent the operation of said motor from interfering with radio reception.

5. In combination, an electric motor in a power circuit, a housing of electric insulating material for said motor, said housing insulatably supporting the motor armature out of direct electrical connection with the motor field core, a metallic shield insulated from said electric motor by said housing, means electrically connecting said field core in circuit with said shield, and means connecting said armature to a power line, to prevent the operation of said motor from interfering with radio reception.

6. In combination, an electric motor in a power circuit a housing of electric insulating material for said motor, a metallic shield insulated from said electric motor by said housing, means connecting the motor field core in circuit with said shield, means connecting the armature shaft in circuit with said shield, and condenser means connected in a circuit with said armature shaft and a power line, to prevent the operation of said motor from interfering with radio reception.

7. In a device of the character described, a metallic body, an electric motor connected in a power circuit, a housing of electric insulating material enclosing said motor, said housing being mounted on said body to insulate said motor from said body to form a shock-proof device, a metallic shield having two parts disposed on opposite interior and exterior walls of said insulating motor housing, means connecting said two part shield electrically, means connecting the motor field core in circuit with said shield, means connecting the armature shaft in circuit with

said shield, and condenser means connected in circuit with said armature and shield, to prevent the operation of said device from interfering with radio reception.

8. In combination, an electric motor in a power circuit, a housing of electric insulating material for said motor, said housing insulatably supporting the motor armature shaft out of direct electrical connection with the motor field core, means connecting said armature shaft and field core in circuit, and condenser means connecting said armature shaft and field core in circuit with a power line, to prevent the operation of said motor from interfering with radio reception.

9. In a device of the character described, a metallic body, an electric motor connected in a power circuit, a housing of electric insulating material for said motor, said housing being mounted on said metallic body to insulate the motor therefrom to form a shock-proof device, said housing insulatably supporting the motor armature shaft out of electrical connection with the motor field core, means electrically connecting said armature shaft to said field core, and condenser means electrically connected to said armature shaft and field core to the power circuit, to prevent the operation of said device from interfering with radio reception.

10. In combination, an electric motor in a power circuit, a housing of electric insulating material for said motor, a metallic shield insulated from said electric motor by said housing, means connecting the motor field core in circuit with said shield, and condenser means connected in a circuit with the armature shaft and a power line to prevent the operation of said motor from interfering with radio reception.

11. In a machine, the combination of a metal body, an electric motor having a field winding, field core and armature, insulating material supporting said motor from said metal body to insulate the motor therefrom, said armature being rotatably mounted in bearings carried by said insulating material, and means for minimizing interference with radio signals by said motor comprising circuits having condensers therein connecting the power lines to said bearings for utilizing the capacitance of the armature core to its coil, and circuits connecting said bearings with said field core.

12. In a machine, the combination of a metallic body, an electric motor having an armature, field core and field coil therefor, insulating material supporting said motor to insulate the latter from said metallic body, and means for minimizing interference with radio signals by said motor comprising a series capacitance circuit including the distributed capacitance of the armature core to its coil and the distributed capacitance of the field core to its coil, said capacitance circuit being connected to one of the power lines, said insulating material supporting said armature out of electrical connection with said field core.

13. In an electric motor assembly, means for isolating electrical disturbances caused thereby comprising, means for insulating the armature shaft in the motor housing, and a circuit connecting the field core with the insulated armature shaft.

14. In an electric motor assembly, means for isolating electrical disturbances caused thereby comprising, means for insulating the armature shaft in the motor housing, a circuit connecting the field core with the insulated armature shaft,

and circuit means connecting said insulated armature shaft with a source of current.

15. An electric motor assembly, means for isolating electrical disturbances caused thereby comprising, means for insulating the armature shaft from the motor housing, a circuit connecting the field core with the insulated armature shaft, and a circuit including condenser means connecting said insulated armature with the source of current.

16. In an electric motor assembly, means for isolating electrical disturbances caused thereby comprising, means for insulating the armature shaft from the motor housing, a metallic shield, a circuit connecting the armature shaft to said shield, and a circuit connecting the field core to said shield.

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