

Jan. 9, 1940.

F. C. DOUGHMAN

2,186,578

ELECTRIC CORD SET

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2 Sheets-Sheet 1

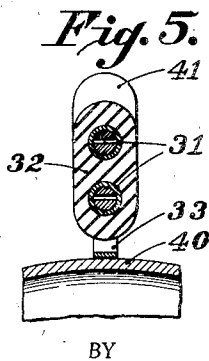
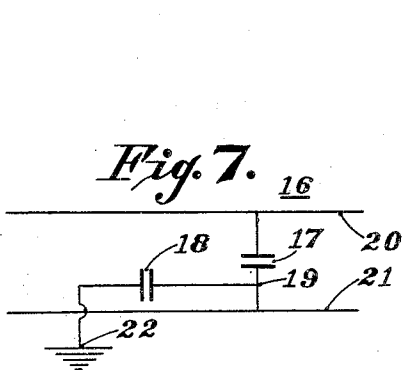
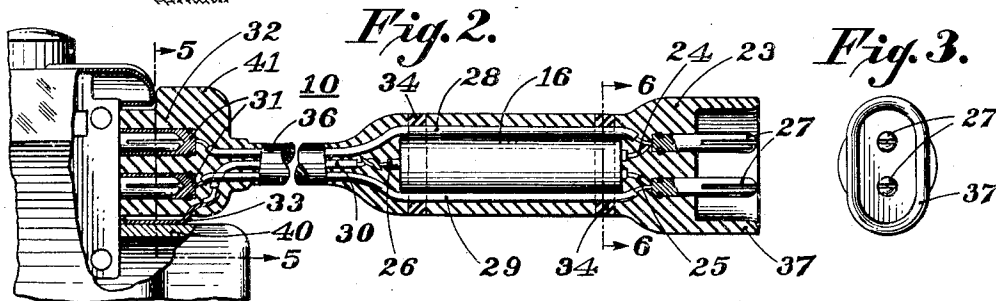
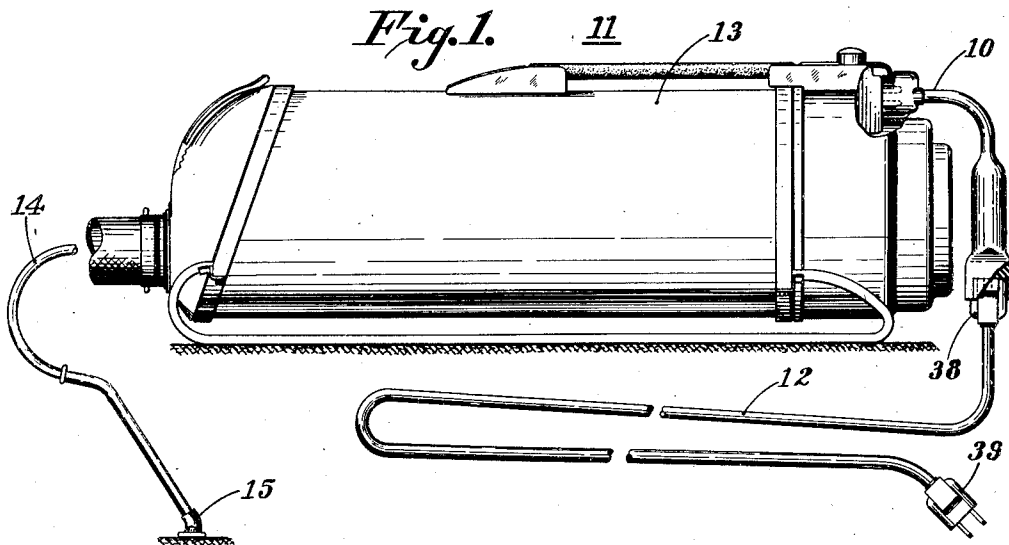


Fig. 6.

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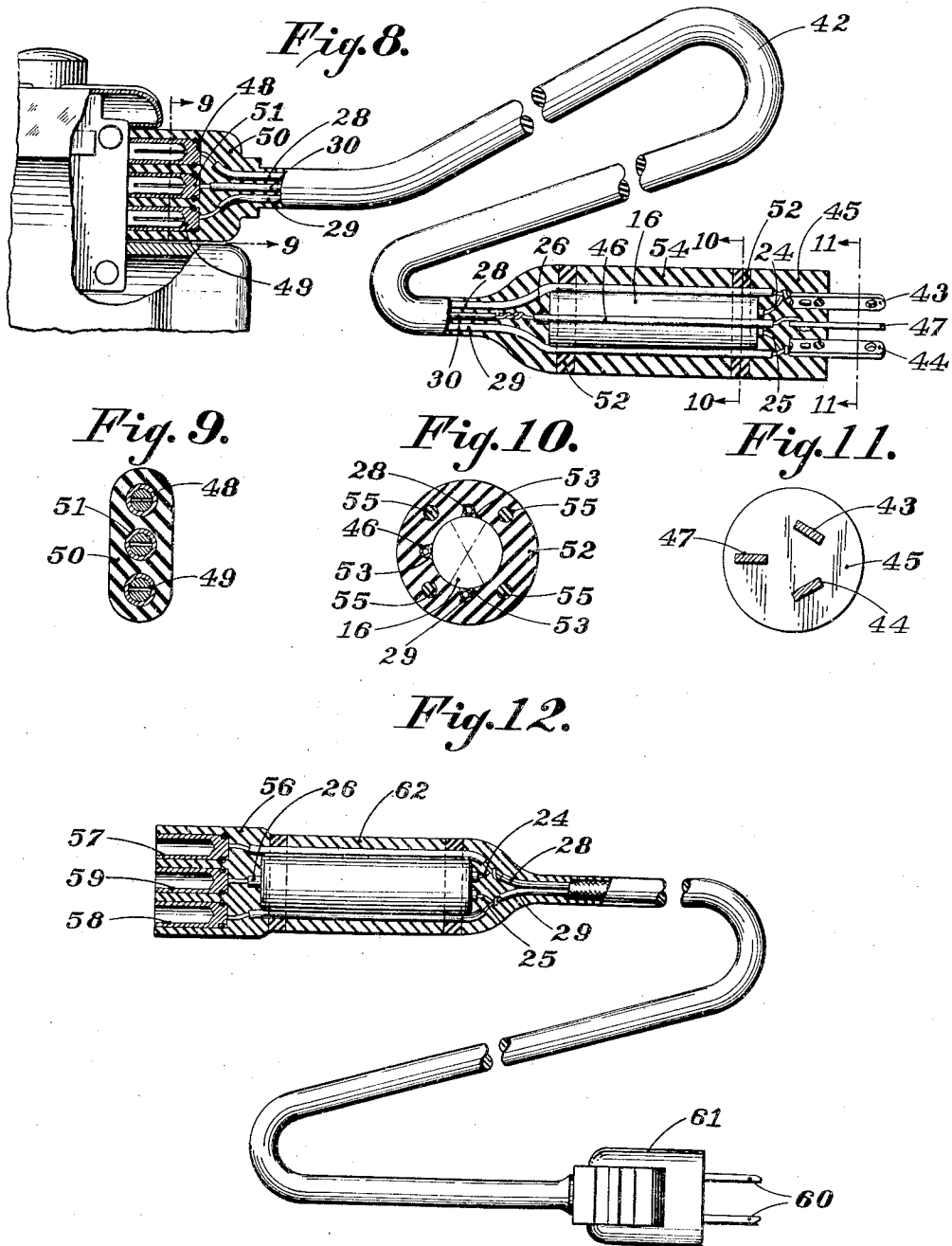
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ELECTRIC CORD SET

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2 Sheets-Sheet 2



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2,186,578

ELECTRIC CORD SET

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to Electrolux Corporation, Dover, Del., a corporation of Delaware

Application December 2, 1937, Serial No. 177,740

3 Claims. (Cl. 178-44)

My invention relates to an electric cord set and more particularly to an electric cord set with means incorporated in it for filtering or by-passing high frequency electric currents.

In the operation of electrical appliances high frequency electric currents may be generated or pulsations produced which do not affect the proper functioning of the appliance. However, these high frequency currents or pulsations, if transmitted through the supply lines, antenna, or ground connectors to a radio circuit, may produce static in the radio circuit and so interfere with the reception of one or more radio programs. While the operation of appliances does not often affect radio reception when radio interference does occur it may be eliminated by connecting a so-called radio filter to the appliance. The radio filter usually consists of condensers connected to the appliance for filtering out or by-passing the high frequency currents or pulsations. In view of the fact that it is seldom that the operation of an appliance will affect radio reception it is not desirable to build a radio filter or interference eliminator into appliances. A radio interference eliminator which can be conveniently connected to an appliance causing radio interference is highly desirable.

In accordance with my invention, a cord set is provided with a radio filter or interference eliminator incorporated in it which may be used with any appliance that tends to produce radio interference, or may be used with all appliances without the necessity of determining which one of them does produce the interference. By incorporating a radio filter in the cord set and covering it with a flexible material it is made rugged so that it will withstand the hard usage to which portable appliances are subjected.

What I consider to be novel and my invention may be better understood by reference to the following specification and appended claims when considered in connection with the accompanying drawings, in which

Fig. 1 is a view showing a radio filter incorporated in an auxiliary cord set connected between a vacuum cleaner and a conventional cord set;

Fig. 2 is a sectional view of the auxiliary cord set of Fig. 1;

Fig. 3 is an end view of the auxiliary cord set of Fig. 2;

Fig. 4 is a plan view of the auxiliary cord set of Fig. 2;

Fig. 5 is a sectional view along line 5-5 of Fig. 2;

Fig. 6 is a sectional view taken along the line 6-6 of Fig. 2;

Fig. 7 is a schematic wiring diagram of the filter;

Fig. 8 is a modified form of cord set;

Fig. 9 is a sectional view along line 9-9 of Fig. 8;

Fig. 10 is a sectional view along line 10-10 of Fig. 8;

Fig. 11 is an end view looking in the direction of arrows 11-11 of Fig. 8; and

Fig. 12 shows another modified form of cord set.

Referring to the drawings, numeral 10 designates an auxiliary cord set connected between a vacuum cleaner 11 and a conventional cord set 12. Vacuum cleaner 11 is shown by way of an example of a portable appliance with which the invention may be used. Vacuum cleaner 11 is of the type having a cleaner unit 13 supported on the floor and moved from place to place by pulling on a flexible conduit or hose 14 to which is connected a cleaning tool 15. The unit 13 is usually connected to a source of electrical supply by means of a cord set 12. If radio interference should be encountered in the operation of the appliance it may be eliminated by connecting the auxiliary cord set 10 between the appliance and the usual cord set.

Auxiliary cord set 10 has incorporated in it a radio filter unit 16. A schematic diagram of the filter unit 16 is shown in Fig. 7. Two condensers 17 and 18 are connected together at 19. Instead of two condensers a single condenser may be used with a tap intermediate its ends. The condenser 17 is connected to two conductors 20 and 21 which are adapted to be connected at one end to an appliance and at the other end to a source of electrical supply. The condenser 18 is connected by means of its terminal that is common with a terminal of condenser 17 to conductor 21. The other terminal of condenser 18 is connected to a ground connection at 22. Instead of this ground connection a connection may be made to the frame or casing of the appliance. The condensers 17 and 18 by-pass or suppress the high frequency currents or pulsations so that they are not transmitted over the electrical supply system.

Referring particularly to Figs. 2 to 6, the filter unit 16 is incorporated in the auxiliary cord set 10 adjacent a male plug 23. Two leads 24 and 25 are brought out at one end of the filter unit 16 one of the leads being connected to a common terminal of two condensers or to an intermediate

tap of a single condenser. A third lead 26 is brought out at the other end of filter unit 16.

While filter unit 16 is shown as of a slender and relatively long cylindrical shape, other shapes or forms of filter unit may be used. Leads 24 and 25 are connected to two terminals 27 of plug 23 to which conductors 28 and 29 are also connected. Lead 26 is connected to a third conductor 30. Conductors 28 and 29 are connected at their opposite ends to two terminals 31 of a female connector 32. Conductor 30 is connected at its opposite end to a contact 33. Two spacers 34 of disc shape are positioned on filter unit 16 adjacent opposite ends. The spacers 34 are preferably formed of a substantially rigid material such as hard rubber. Two recesses 35 are provided in the spacers 34 through which the conductors 28 and 29 may pass. It may be found desirable to use more than two spacers 34 depending upon the size of the filter unit 16. The spacers 34 perform the dual functions of protecting the filter unit 16 from unusual crushing forces and the conductors 28 and 29 from strain tending to sever their connections to the terminals 27 by twisting.

An overall covering 36 of flexible insulating material preferably soft rubber is provided for the auxiliary cord set 10. Covering 36 can best be formed in steps by first forming it on the conductors 28, 29, and 30 and then separately on the filter unit 16 and terminals 27 forming plug 23 and the terminals 31 forming connector 32. If a rubber compound is used for covering 36 it may be vulcanized or cured in successive steps as it is applied. Plug 23 is provided with a lip 37 integral with covering 36 and extending to substantially the ends of terminals 27. Lip 37 provides a protective insulating covering for the terminals 27 to prevent a shock or short circuit upon the connection of a connector 38 of cord set 12 after a plug 39 has already been connected to a source of electrical supply. Lip 37 also serves to provide a moisture and waterproof protection for the terminals 27 when connector 38 is connected to them.

Contact 33 is carried by connector 32 and extends exteriorly of the covering 36 at one side of the body of connector 32. When connector 32 is connected to an appliance such as vacuum cleaner 11 the contact 33 engages a metallic portion of the casing of cleaner unit 13 as at 40. To prevent the reversal in position of the connector 32 so that a good connection between the casing of cleaner unit 13 and contact 33 is assured the body of connector 32 is formed with a lug 41 preventing the connector 32 from fitting but in one position.

In the use of vacuum cleaners of the type of vacuum cleaner 11 at times the cleaner unit 13 may stand upright on its rear end shown at the right in Fig. 1. Any protuberance extending from the connector 32 may interfere with the placing of the cleaner unit 13 in this position or may be damaged. To prevent such a possibility the filter unit 16 is mounted adjacent the plug 23 and sufficient length of conductors 28, 29, and 30 provided between the connector 32 and filter unit 16 to permit the bending of the cord set 10 adjacent the connector 32 without any danger of damage to the filter unit 16.

In a modified form of construction shown in Figs. 8 to 11 filter unit 16 is incorporated in a cord set 42 of sufficient length so that it may be substituted for the conventional cord set 12 instead of being used in conjunction with it as in

the case of the auxiliary cord set 10 described above. Similar parts are designated by the same numerals used heretofore. The two leads 24 and 25 of filter unit 16 are connected to two prongs 43 and 44, respectively of a three prong plug 45. Conductors 28 and 29 are also connected to prongs 43 and 44, respectively. Conductor 30 is connected to the third lead 26 of filter unit 16. Lead 26 is connected by means of an insulated wire 46 to the third prong 47 of plug 45. The prong 47 is adapted to complete the connection to a grounded circuit at the receptacle or convenience outlet (not shown) to which the plug 45 is connected.

The conductors 28 and 29 are connected at their opposite ends to two female terminals 48 and 49, respectively, of a three contact connector 50. The third terminal 51 of connector 50 located between the terminals 48 and 49 is connected to conductor 30. Terminal 51 is adapted to complete a connection to the metal frame of the casing of cleaner unit 13 at a point not shown in the drawings. By this arrangement with the terminal 51 for connecting the conductor 50 it does not matter whether the terminal 48 or 49 is positioned at the top so the connector 50 may be connected in either position.

The conductor 30 in addition to connecting the casing of cleaner unit 13 to the lead 26 of filter unit 16 also connects the casing to ground through wire 46 and prong 47. In some localities the connection of the casing of a portable appliance to ground is considered desirable and in the case of washing machines and similar appliances is required. By using cord set 42 it would be unnecessary to make any other or special connection between the appliance casing and ground. Two discs 52 of vulcanized fiber or like material are located on the filter unit 16 at opposite ends. Recesses 53 permit the passage of conductors 28, 29, and 30 through the discs 52 and serve to position the conductors around the filter unit 16. To permit a bond between the discs 52 and an overall covering 54 of flexible insulating material a plurality of spaced holes 55 are provided in discs 52 through which the material of covering 54 may extend. It may be found desirable in some cases to omit from the cord set 42 the conductor 30 and terminal 51 or the wire 46 and prong 47. However, one or the other of the connections for lead 26 of filter unit 16 should be provided. In the manufacture of cord set 42 the same steps can be followed as in the case of auxiliary cord set 10.

In the modification illustrated in Fig. 12 the filter unit 16 is combined with a three terminal connector 56. This construction may be used where a protuberance from the connector is of no concern. The leads 24 and 25 are connected to the conductors 28 and 29, respectively, intermediate their ends. The adjacent ends of conductors 28 and 29 are connected to the two outside terminals 57 and 58, respectively, of connector 56. Lead 26 is connected directly to the center terminal 59 of connector 56. The opposite ends of conductors 28 and 29 are connected to two prongs 60 of a conventional two prong plug 61. Filter unit 16 and connector 56 are provided with a unitary covering 62 of flexible insulating material. A female connector similar to the connector 32 shown in Fig. 2 may be substituted for the connector 56.

What I claim is:

1. In an electric cord set, a connector having a plurality of electric terminals, a condenser relatively long in comparison to its width connected to said terminals and located in juxtaposition to said connector, a plurality of substantially rigid spacers surrounding and spaced apart longitudinally along said condenser, and a unitary covering of flexible insulating material surrounding said connector and said condenser, said rigid spacers acting to protect said condenser from injury by the operator of an appliance with which the said cord set may be associated.
2. In an electric cord set, a connector having a plurality of electric terminals, a plurality of condensers extending longitudinally from said connector, a plurality of substantially rigid discs extending around and spaced apart longitudinal-

ly along said condensers, and a unitary covering of flexible insulating material surrounding said connector and said condensers, said rigid disks acting to protect said condenser from injury by the operator of an appliance with which the said cord set may be associated.

3. In an electric cord set, a plurality of electric terminals, an electric condenser relatively slender in comparison with its length connected to said terminals and positioned longitudinally in line with said terminals, a plurality of vulcanized fiber spacers surrounding and spaced apart longitudinally along said condenser, and a unitary covering of flexible insulating material for said terminals and said condenser, said fiber spacers acting to protect said condensers from injury by the operator of an appliance with which the said cord set may be associated.

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