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A. M. TROGNER

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HIGH FREQUENCY CONTACT DEVICE

Filed March 9, 1929

Fig. 1.

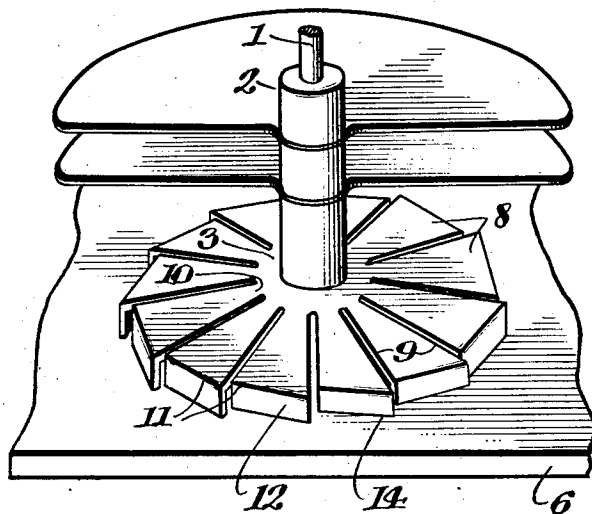


Fig. 2.

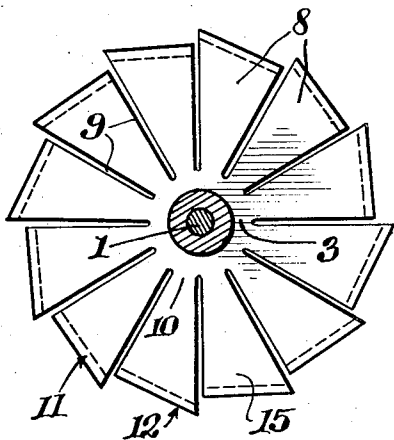
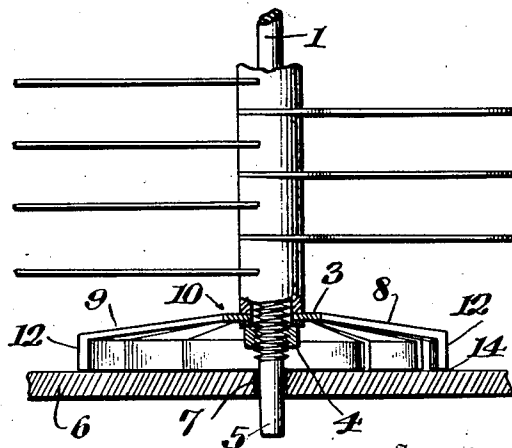


Fig. 3.



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HIGH-FREQUENCY CONTACT DEVICE

Application filed March 9, 1929. Serial No. 345,855.

My invention relates broadly to means for establishing electrical connection between a movable member and a stationary surface, and more particularly to a device for improving the efficiency of high frequency electrical apparatus.

One of the objects of my invention is to provide a construction of electrical conductor for high frequency apparatus whereby a large conductive area for the distribution of high frequency currents is provided for establishing connection between a stationary conductive surface and a rotatable member movable with respect thereto.

Another object of my invention is to provide a construction of electrical connector for the end of the rotatable shaft member wherein a plurality of independent paths are provided for distributing high frequency energy from the central rotatable shaft to a stationary surface, the paths extending from the shaft to the stationary surface so disposed relative to each other as to have practically equal radio frequency resistance.

A further object of my invention is to provide a construction of electrical connector disposed between a rotatable shaft and a stationary surface, the connector being provided with a multiplicity of spaced sectors each of which carry a substantially equal distribution of current between the rotatable shaft and the stationary surface.

Other and further objects of my invention reside in the construction of an electrical conductor described in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the high frequency conductor of my invention; Fig. 2 is a plan view of the high frequency conductor of my invention; and Fig. 3 is a cross-sectional view of the high frequency conductor of my invention.

In electrical signaling systems and in general wherever high frequency signaling energy is employed, there is a considerable loss of efficiency in poor conducting surfaces. It is well known that when high frequency energy is conducted by means of metal, such

high frequency energy travels on the surface of the conducting member, the degree of penetration becoming less as the frequency of the energy is increased. It is therefore evident that the cross-sectional area of radio frequency conductors need not be large but that the surface area should be made large enough to conduct the radio frequency energy without appreciable resistance. High frequency inductance coil systems employing copper tubing have advantages not found with conductors which are solid and have a large cross-sectional area. When such designs have been employed for increasing the efficiency of the system, the overall efficiency is usually low because of high radio frequency resistance in other parts of the system. This high resistance is most common when it is desirable to conduct radio frequency energy from one surface to another. It therefore becomes necessary to provide improved radio frequency conductors that will have large surface areas and hence offer a low resistance to radio frequency energy. It frequently happens that it is desirable to cause a transfer of radio frequency energy from a movable member to a stationary member. Such transfer is desirable when capacities are employed which are adjustable and when a movable coil is employed in inductive relation with a second coil. It therefore is necessary to provide an efficient conducting system which will insure low radio frequency energy loss due to surface resistance.

Referring to the drawings in more detail, I have illustrated my invention as applied to the rotary shaft of a variable condenser, but it will be understood that the device of my invention may be applied to various forms of high frequency electrical apparatus where it is necessary to establish a connection between a stationary surface and a rotatable shaft member. The variable condenser is provided with a plurality of rotor plates 2 carried by rotatable shaft member 1 on the end of which there is secured for movement with the shaft the electrical conductor of my invention illustrated at 3. The

electrical conductor 3 is constructed from resilient metallic material and is secured to the end of shaft 1 by nut member 4 which is screw threaded on the end of the shaft 1 projecting as represented at 5 through the metallic end plate 6. The plate 6 forms a bearing for the end of the shaft 1. Normally all of the high frequency energy which passes to or from the rotor plates 2 must be distributed over the journaled end 5 of shaft 1 and through the bearing 7 in plate 6, which results in considerable loss and inefficiency in high frequency apparatus. However, the conductive member 3 of my invention is disposed between the shaft 1 and the plate 6 in such manner as to provide a multiplicity of distribution paths for the high frequency currents. The device 3 consists of resilient metal having a substantially circular contour and composed of a plurality of radiating sector portions 8. The sector portions 8 are divided by radial slots 9. The portions 8 are relatively narrower adjacent the center as represented at 10 and are substantially wider at 11. The exterior ends of the sectors are bent downwardly as represented at 12 to frictionally engage the surface 6. The connecting member is substantially flat at its center as represented at 13 and is then provided with a substantially conical surface including the planes of the sector portions 8. The downwardly depending portions 12 extend at substantially an obtuse angle to the sector portions 8 and terminate in a flat edge 14, providing an abutment with the surface of the plate 6 permitting the distribution of high frequency current with a high degree of efficiency. The edges 14 extend in a straight line which is substantially tangent to a curve passing through the shortest radius of the sector. I have indicated such a curve by dotted lines at 15 in Fig. 2. The edges 14 of the sectors are thus angularly disposed one to the other providing an angularly disposed plate which actually sweeps the surface of the conductive plate 6 as the shaft 1 is rotated, thus establishing good electrical connection with substantially negligible loss.

The device of my invention has been found to be extremely practical in its construction, and while I have described a preferred embodiment of my invention, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claim.

What I claim as new and desire to secure by Letters Patent of the United States is:

A device for establishing connection between a rotatable shaft and a conductive plate comprising an integral metallic sheet secured at its center to the rotatable shaft and being constituted by a multiplicity of radially positioned sectors each terminating in angularly disposed end portions with the extreme edges thereof engaging the surface of said conductive plate, each of said edges extending in a plane substantially tangent to a circle drawn through the smallest radius of the sector to which the edges connect.

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