April 19, 1938. E. O. MUELLER 2,114,887

SALIENT-POLE CONSTRUCTION FOR ELECTRIC MACHINES

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Fig. 1.

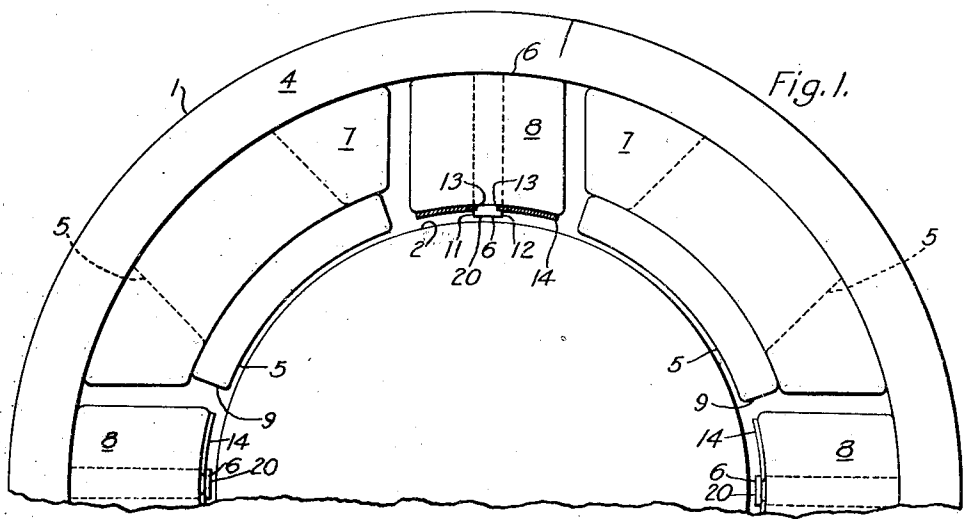


Fig. 2.

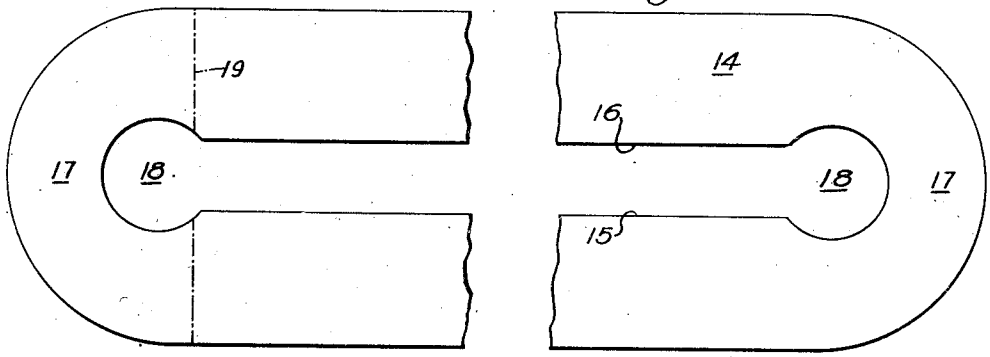
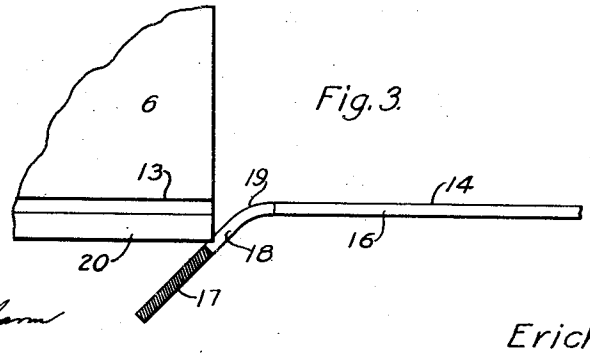


Fig. 3.



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SALIENT-POLE CONSTRUCTION FOR ELECTRIC MACHINES

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2 Claims. (Cl. 171—252)

My invention relates to means for retaining an electrical coil on a projecting or salient pole-piece of an electrical apparatus, and it has particular relation to a commutating-pole construction for a direct-current railway motor.

An object of my invention is to facilitate the design and construction of railway motors, which are characterized by the necessity for obtaining the maximum possible output in a given restricted space, in order to meet competition and in order to effect very substantial savings in the motor-vehicle to which the motor is applied. This means that the available space for interpole or commutating-pole pieces is quite limited, and that it is difficult to find available room for the interpole or commutating coils.

In accordance with my invention, I make the interpole pieces with a substantially uniform cross section throughout their length, that is, without an enlarged pole-face member on the end thereof, thus making it possible to utilize an interpole coil which extends further out along the interpole member, occupying some of the space which would normally have been occupied by the usual pole-face member which has heretofore been commonly located at the armature end of the interpole members.

It is a more specific object of my invention to provide a novel coil-retaining washer and corresponding slotted pole-piece construction whereby the processes of assembling and dismantling the pole-piece structure is very much simplified, and whereby the need for resilient retaining members for holding the pole-piece coils in place is avoided, this function being taken over by the retaining washer itself.

With the foregoing and other objects in view, my invention consists in the apparatus, combinations and methods hereinafter described and claimed, and illustrated in the accompanying drawing, wherein:

Figure 1 is a somewhat diagrammatic end view of a direct-current railway motor showing my invention applied to the interpole structure thereof,

Fig. 2 is a plan view of one of the coil-retaining washers, and

Fig. 3 is a detailed side view showing the method of application and removal of the washers.

My invention is illustrated as being applied to a direct-current railway motor comprising a stator member 1 and a rotor member 2. The stator frame 1 is of the salient-pole type, comprising a frame-yoke member 4 and a plurality of salient main-pole and interpole pieces 5 and 6 which are secured to the frame yoke member 4 so as to project inwardly therefrom, so as to cooperate with the armature or rotor 2. The pole-pieces 5 and 6 are provided, respectively, with main and commutating coils 7 and 8 which surround the respective pole-pieces and are suitably secured thereto, the shanks of the respective pole-pieces being necessarily smaller than the centers or holes of the coils which slide onto them. The main coils 7 are held on the main pole-pieces 5 by means of an enlarged pole-face head 9 on the end of each of the main pole-pieces 5.

According to my invention, the interpole pieces 6 are made without any enlarged pole-face heads, being of substantially the same cross section throughout the entire length of the interpole piece. The two sides 11 and 12 of each interpole piece are made approximately parallel to each other and each of these sides is provided, near the end of the pole-piece, with a slot 13, the two slots 13 of each pole-piece being in a plane which is substantially normal to the axis of the pole-piece, said plane being the plane of a washer 14 which is applied so as to engage said slots 13.

As shown more in detail in Fig. 2, the washer 14 has two approximately parallel sides 15 and 16 which are so spaced from each other as to just fit in the opposed slots 13 of an interpole piece. The washer has also two closed ends 17, one or both of which are characterized by an enlarged opening 18 in the washer.

In the application of the washer 14 to the interpole structure, the washer is bent near an enlarged opening 18, as indicated at 19 in Figs. 2 and 3, whereupon the opening 18 clears the unslotted tip end 20 of the interpole piece 6, so that the washer can be slid into place, after which the bent end of the washer is bent up again into the plane of the washer so that the washer is securely locked in place. The washer may be of spring steel or other resilient or non-resilient material, either magnetic or non-magnetic. It is preferably made of resilient material so that it can be made to fit tightly and resiliently against the interpole coil 8 so as to hold the latter in place on the interpole piece 6 without the necessity for the loss of space which would be occasioned by the use of separate spring-washers or resilient frame-constructions for holding the interpole coils 8 against movement.

I claim as my invention:

1. Electrical apparatus comprising a frame, a salient pole piece extending from said frame, an electric coil surrounding said pole piece, the free

end of said pole piece having a cross-section characterized by two approximately parallel sides, said pole piece having a slot in each of said parallel sides near the end of the pole piece, the two slots being in a plane substantially normal to the axis of the pole piece, and a washer having two approximately parallel sides fitting in said slots, said washer having two closed ends joining said sides, at least one of said ends being characterized by an enlarged opening in the washer large enough to clear the unslotted tip end of the pole piece, said washer being bendable near said enlarged opening to permit the application and the removal of the washer to and from the pole piece by sliding in said slots with said enlarged opening clearing the unslotted tip end of the pole piece.

2. A dynamo-electric machine characterized by having a salient-pole stator member comprising a frame yoke member, a plurality of salient pole pieces projecting inwardly from said frame yoke member, and a plurality of electric coils surrounding at least certain of said salient pole pieces, each of said certain salient pole pieces having a cross-section characterized by two approximately parallel sides, each of said certain salient pole pieces having a slot in each of said parallel sides near the end of the pole piece, the two slots being in a plane substantially normal to the axis of the pole piece, and a washer having two approximately parallel sides fitting in said slots, said washer having two closed ends joining said sides, at least one of said ends being characterized by an enlarged opening in the washer large enough to clear the unslotted tip end of the pole piece, said unslotted tip end being smaller than the hole of the associated electric coil, said washer being bendable near said enlarged opening to permit the application and the removal of the washer to and from the pole piece by sliding in said slots with said enlarged opening clearing the unslotted tip end of the pole piece.

ERICH O. MUELLER.