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CUSHIONING DEVICE

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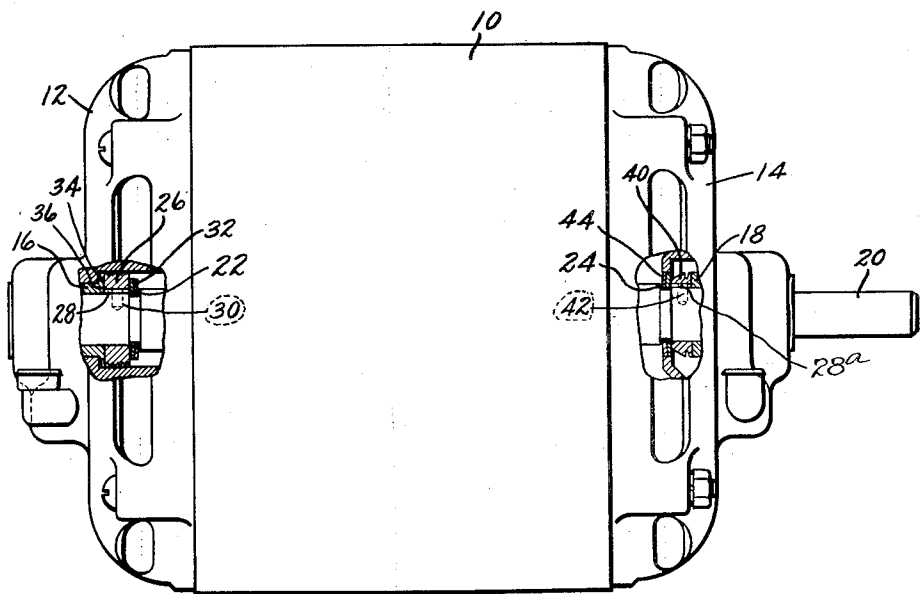


Fig. 1

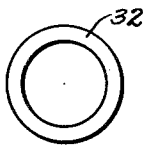


Fig. 2

Fig. 3

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## UNITED STATES PATENT OFFICE

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## CUSHIONING DEVICE

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This invention relates to electric motors and in particular to a device for buffing or cushioning the end play of the rotor.

Various methods have been used to cushion the end play of the rotors or armatures. One of the common forms is the use of spring washers intermediate a shoulder on the armature shaft and the frame of the motor. This however, is objectionable for motors used where silence is required, as for example motors used in household appliances. The spring washers rotate at various speeds, some at substantially the speed of the armature, others at various lower speeds. In other words, there are a plurality of pairs of surfaces in frictional engagement. Whenever one surface slips relative to another sound may be produced. The greater the number of sources of sound, the louder it will be.

The object of this invention is to suppress the unwelcome sounds from an electric motor by reducing the number of sources of noises. This has been accomplished by mounting on each end of the armature shaft a member having a surface engaging the end frame of the motor, said member being fixed to rotate with and free to move axially on the shaft, and mounting resilient means engaging said member and said shaft for biasing the shaft in a direction parallel to its axis, the resilient means rotating at the same speed as the shaft. This reduces the number of surfaces having relative rotary movement. Instead of a plurality of surfaces moving relative to each other, only two surfaces on each end have a relative movement. When the resilient means or washers rotate with the shaft it has been found that this silences the motor.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 shows an electric motor with parts broken away so as to show the invention in section.

Figs. 2 and 3 are end and side views of a spring washer.

In the drawings the reference character 10 indicates an electric motor having end frames 12 and 14 provided with bearings 16 and 18, respectively. The armature shaft 20, having the shoulders 22 and 24, is journaled in the bearings 16 and 18. An annulus or floating collar 26, provided with a groove 28 extending parallel to the axis of the annulus cooperating with a key 30 seated in the shaft 20, rotates with the shaft 20 but is freely movable longitudinally or axially along the shaft. Intermediate the annulus 26 and the shoulder 22 on the armature shaft 20 is mounted a plurality of resilient or spring washers 32 which bias the shaft 20 to the right, as viewed in Fig. 1. As the washers 32 are gripped intermediate the annulus 26 and the shoulder 22 these will rotate with the armature shaft 20. By providing the annulus 26 with a smooth finished surface 34 which cooperates with a finished end 36 of the bearing 16 very little noise, if any, will be produced by the two surfaces 34 and 36 rotating relative to each other, especially when these surfaces are properly lubricated.

Adjacent the bearing 18 is mounted an annulus 40 provided with an internal groove 28a extending parallel to the axis of the annulus said groove receiving a key 42, secured to the shaft 20, whereby the annulus 40 is fixed to rotate with and free to move longitudinally along the shaft. Mounted intermediate the annulus 40 and the shoulder 24 are a plurality of washers 44 biasing the shaft 20 to the left as viewed in Fig. 1, against the resilient washers 32 already described. The contacting surface between the bearing 18 and the annulus 40, is also finished so as to rotate smoothly with respect to each other.

In this preferred embodiment two annuluses and two sets of resilient washers have been disclosed, the scope of the invention however, is not limited to the use of two annuluses and two sets of resilient washers, as two members and two sets of helical springs could be used or some other resilient members without departing from the purview of this invention.

This invention has been disclosed in combination with the armature shaft of an elec-

tric motor. The scope of the invention is not limited to the cushioning of an armature as the device has a general application to the cushioning and silencing of any rotary member which has an end play.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A device for cushioning axial movement of an armature shaft journalled in the end frames of a motor, comprising in combination, a member mounted on said shaft having a surface engaging the frame of the motor, said member being fixed to rotate with and free to move axially on the shaft; a resilient washer engaging said member and said shaft for biasing the shaft in a direction parallel to its axis.

2. A device for limiting axial movement of an armature shaft journalled in the end frames of a motor, said shaft having a pair of shoulders, one spaced a short distance from one end frame and the other a short distance from the other end frame, comprising in combination, a member fixed to rotate with and free to move axially on said shaft, said member having a surface in contact with one of the end frames; resilient means mounted intermediate one of said shoulders and said member biasing the shaft in a direction parallel to the axis of said shaft, said resilient means being gripped by the member and the shoulder so as to rotate at the same speed as the shaft and the member; a second member fixed to rotate with and free to move axially on said shaft, said second member having a surface in contact with the other end frame; a second resilient means mounted intermediate the second member and the other shoulder biasing the shaft in a direction opposite to the direction the shaft is biased by said first means, said second resilient means being gripped by the member and the shoulder so as to rotate at the same speed as the shaft and the second member, thereby reducing chattering noises.

3. A device for cushioning the axial movement of a rotatable shaft comprising, in combination, bearings supporting said shaft; a collar carried upon said shaft so as to be rotatable with and longitudinally movable relative to the shaft, one surface of said collar engaging a bearing of the shaft; an abutment on said shaft spaced from the collar thereon; and a resilient washer on the shaft, interposed between the abutment and the adjacent end of the collar, said washer biasing the shaft in a direction parallel to its axis.

In testimony whereof I hereto affix my signature.

HARRY J. KOEHL.