Oct. 28, 1941. M. S. WILSON 2,260,813

ANTIRATTLING MOUNTING FOR INSTRUMENT ARMATURES

Filed May 23, 1939

Fig. 1.

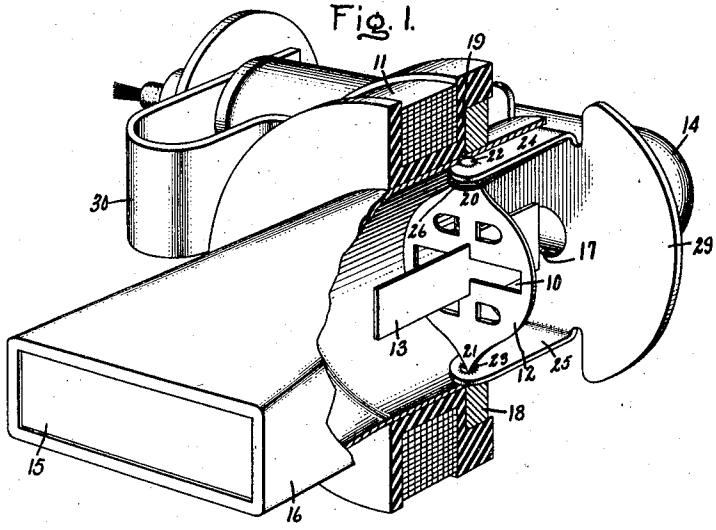


Fig. 2.

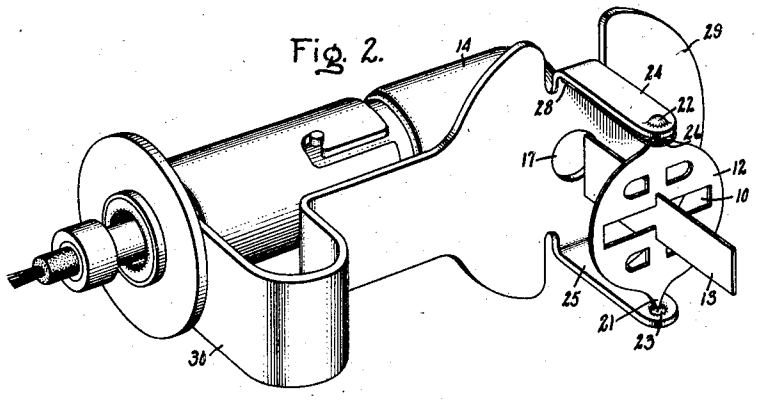
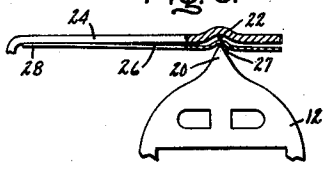


Fig. 3.



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ANTIRATTLING MOUNTING FOR INSTRUMENT ARMATURES

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2 Claims. (Cl. 308—159)

My invention relates to current responsive instruments and concerns particularly mounting arrangements for the movable elements of said instruments arranged to eliminate vibration and rattling.

It is an object of my invention to provide an improved, easily manufactured current responsive instrument in which the movable element is securely mounted to prevent jarring out, and at the same time is arranged to have friction damping and resilient support to guard against vibration or rattling.

It is particularly an object of my invention to provide a tuning instrument construction for radio receivers which will not be subject to rattling induced by vibrations caused by a loud speaker. Other and further objects and advantages will become apparent as the description proceeds.

In connection with radio tuning instruments of the shadow type having rotatably mounted movable vanes with pivots, in carrying out my invention in its preferred form, I provide bearing brackets with substantially spherical depressions therein to cooperate with the pivots on the moving vane. At the inner side of one of the bearing brackets I provide a leaf spring with a pivot-receiving depression therein corresponding to the depression in the main bracket adapted to bear resiliently against the pivot of the movable element with such pressure as to introduce only enough friction for damping purposes and to prevent pounding of the pivots in the bearings in response to vibration caused by oscillatory currents in the loud speaker or other parts of the electrical apparatus.

The invention will be understood more readily from the following detailed description when considered in connection with the accompanying drawing and those features of the invention which are believed to be novel and patentable will be pointed out in the claims appended hereto. In the drawing Fig. 1 is a perspective view of a radio tuning instrument of the shadow type utilizing one embodiment of my invention, a portion of the instrument being broken away along a longitudinal section in order to expose the interior thereof. Fig. 2 is a perspective view from another angle of the movable element and the mounting therefor of the apparatus shown in Fig. 1, and Fig. 3 is a fragmentary detail view, partially in section, of the arrangement for providing resilient support of the upper pivot of the movable element shown in Figs. 1 and 2. Like reference characters are utilized throughout the drawing to designate like parts.

Shadow tuning instruments of the type illustrated in United States Patent 2,058,939 to Arey have been built into the cabinets of radio receivers for use as indicators to show when the receiver is in tune. Such receiver cabinets usually house also a loud speaker in which electrical and mechanical oscillations and vibrations of considerable amplitude are frequently produced. These oscillations and vibrations subject the movable element of the tuning instrument to oscillatory forces which tend to cause it to vibrate or to rattle within its supports. The construction embodying my invention is designed to overcome this tendency.

The instrument shown in the drawing, by way of illustration, is of the shadow tuning type operating in a manner described in the above-mentioned Arey patent, and comprises fundamentally a current conducting coil 11 within which is supported a vane 12 of magnetizable material with a vertical axis of revolution perpendicular to the magnetic axis of the coil 11, having a light-transmitting window 10, and carrying a shutter 13 perpendicular to the vane 12. A lamp 14 is provided at the back of the instrument and a translucent screen 15 is provided at the front of the instrument in order that a shadow of the shutter 13 will be cast upon the screen 15 varying in width in accordance with the angular position of the movable vane 12 which, in turn, depends upon the magnitude of the current flowing in the coil 11.

It will be understood that the instrument is so constructed as to form a light tight box here represented by the non-magnetic metallic housing 16 with a rectangular front opening closed by the screen 15 and a small circular rear aperture 17 behind which the lamp 14 is mounted. Suitable means are provided for biasing the vane 12 to a position in which it is perpendicular to the magnetic axis of the coil 11 or parallel to the plane thereof so that the flow of current in the coil 11 will tend to deflect the vane 12. For example, as in the arrangement of the aforesaid Arey patent, a C-shaped biasing magnet 18 may be provided, having poles (not shown) on either side of the vertical axis of rotation 19 of the vane 12 and in a plane perpendicular to the magnetic axis of the coil 11. The foregoing features do not constitute my invention and, being described in the Arey patent, need not be discussed in further detail.

In accordance with my construction, as in the Arey patent, the movable vane 12 provided with pivots 20 and 21 at the upper and lower ends thereof, respectively, is formed by suitable shaping of the magnetizable sheet constituting the vane 12. The bearings or supports for the pivots 20 and 21, however, in my apparatus consist of depressions 22 and 23, formed in bearing brackets 24 and 25. For the purpose of eliminating any loose play between the bearings and the pivots, one of the bearing brackets, for example the upper bearing bracket 24, has mounted

at the surface thereof toward the vane, in this case the lower surface, an auxiliary bearing bracket 26 in the form of a leaf spring having a pivot receiving depression 27 therein corresponding in position and shape to the depression 22 in the upper main bearing bracket 24. For the sake of maximum resiliency the leaf spring 26 is preferably supported at its end 28 away from the depression 27. The spring 26 may be attached to the bearing bracket 24 in any suitable manner as by means of welds, rivets, screws or the like at the end 28 of the spring 26. Having the spring 26 in contact with the upper pivot rather than the lower one avoids having the weight of the movable vane supported by the spring and permits utilizing a spring of minimum thickness for the sake of maximum responsiveness.

The bearing brackets 24 and 25 are supported by the stationary part of the apparatus in any suitable manner, for example, they may be formed by bending over portions of a sheet 29 of non-magnetic metal forming a removable and adjustable back plate for the casing 16 and including also a lamp base supporting wing 30. It will be understood that the frictional engagement between the brackets 24 and 25 and the inner surface of the housing 16 will serve to hold the back plate 29 in position.

The auxiliary bearing bracket or leaf spring 26 is given a set of the proper amount to cause it to bear lightly upon the upper pivot 20 in order to introduce just sufficient friction for damping purposes without causing "stickiness" of the the bearing. The damping and stickiness may be controlled also by the relationship between the curvatures of the pivot points and bearing depressions. The pressure is sufficient to hold the lower pivot 21 in its depression or bearing 23 to prevent chattering or vertical vibration of the vane 12 in response to electrical or mechanical vibrations taking place in the radio receiver of which the tuning instrument forms a part. In this manner objectionable rattling is eliminated, as well as any reaction upon the electrical circuits and the loud speaker output which might be caused by a vibratory magnetic member in inductive relation to one of the electrical circuits of the radio receiver. Although under normal conditions the resiliency of the spring 26 holds it at all times away from the upper main bearing bracket 24, I consider it desirable to retain the upper bearing bracket 24 to guard against the possibility of the lower pivot 21 being jarred out of its bearing in case of severe mechanical or electrical shocks or during assembly of the tuning instrument in the radio receiver housing. Since the bearing brackets 24 and 25 are for supporting the movable vane 12, as has hereinbefore been stated, it will be understood that the total clearance from the tips of the pivots 20 and 21 to the bottoms of the pivot-receiving depressions 22 and 23 must be less than the depth of the pivot-receiving depressions to prevent the movable vane 12 from falling out of place, although the insertion of the spring strip 26 obviously permits allowance for the thickness of this strip in determining the maximum permissible spacing between the bearing brackets 24 and 25. In the case of the most severe jarring, the spring strip 26, acted upon by the momentum of the vane 12, cannot be moved any further than the position which brings the strip 26 flat against the upper bearing bracket 24. Thus the vane 12 is prevented from jarring out of its supports in the case of severe shocks and is held resiliently without rattling, in the case of less severe vibratory forces.

Although my invention is not limited to the use of specific materials or particular dimensions, by way of example I may mention certain particular relationships I have found to be satisfactory. For example, the spring 26 may be composed of any suitable spring material such as brass, phosphor bronze, or steel. It may have the thickness of the order of approximately .002 of an inch. The radii of the pivot points 20 and 21 may be approximately .003 inch and the radii of the depressions or indentations in the bearing brackets 24, 25 and 26 may be approximately $\frac{3}{32}$ of an inch, in the case of a movable vane having the diameter approximating nine-sixteenths of one inch.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

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

1. In a current responsive instrument, a movable member therefor having a pair of pivots at diametrically opposite points, main bearing brackets, one above the other, and an auxiliary bearing bracket, said auxiliary bearing bracket and said lower main bearing bracket having depressions therein adapted to receive said pivots for supporting said movable element, said upper main bearing bracket having a similar depression, said auxiliary bearing bracket consisting of a strip of spring material attached at one end to said upper main bearing bracket and having at the other end a pivot-receiving depression adapted to fit within the depression of said upper main bearing bracket, said auxiliary bearing bracket being biased away from said upper main bracket whereby the pivots are resiliently engaged with slight friction to provide damping and with a sufficient force to prevent vibration or rattling thereof, the difference in spacing between the main bearing brackets and the pivot tips being such in relation to the depths of the pivot-receiving depressions that the vane cannot drop out even when the spring bracket is jarred against the upper main bearing bracket.

2. An anti-rattling mounting for a movable element comprising a movable element with a pair of pivots extending in diametrically opposite directions, a supported bearing bracket having a cup-shaped depression therein to form a bearing cooperating with one of said pivots, a second bearing bracket comprising a strip of resilient material supported at one end and having at the other end a cup-shaped depression adapted to receive and form a bearing for the second of said pivots, said second bearing bracket being so mounted as to cause its pivot receiving depression to bear lightly against the pivot, and means for preventing said resilient bracket from bending far enough to allow the movable element to drop out.

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