

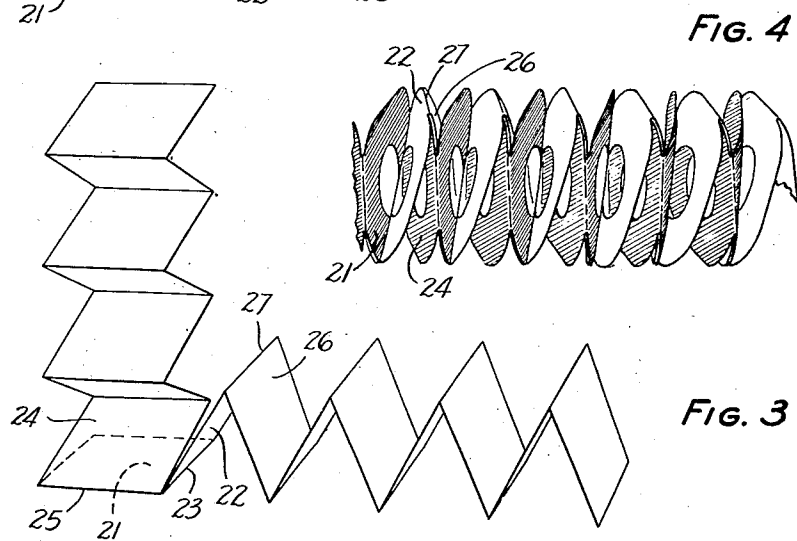
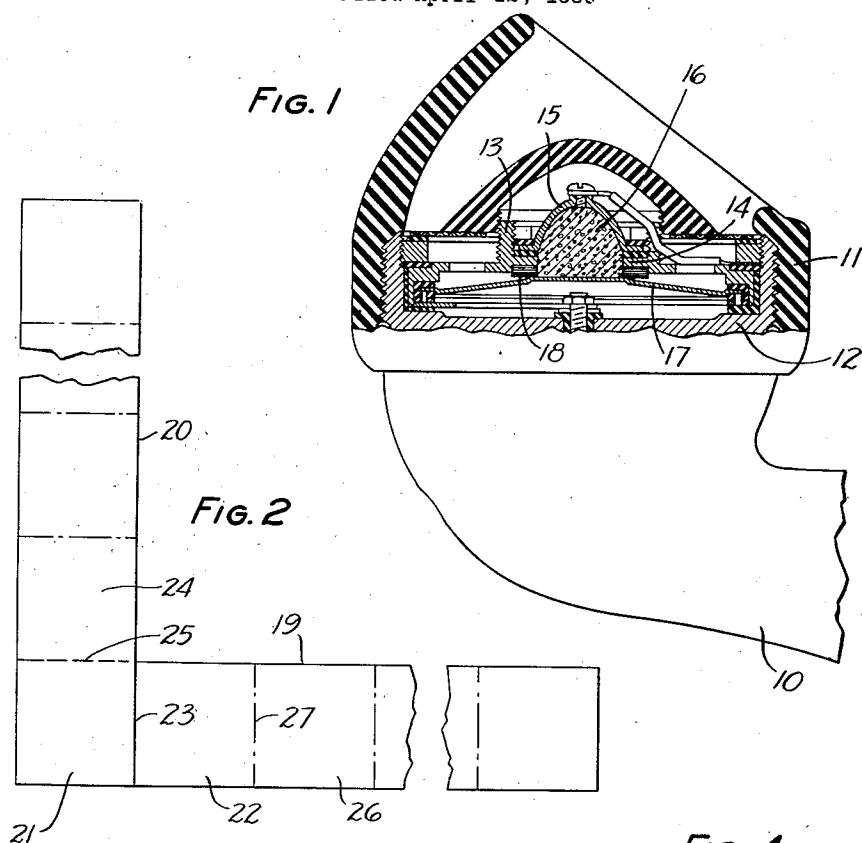
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SOUND TRANSLATING DEVICE

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SOUND TRANSLATING DEVICE

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This invention relates to sound translating devices and more particularly to a unitary element for damping the mechanical motion of a vibratile member in such devices.

5 Damping devices comprising a plurality of loosely disposed leaves adjacent a vibratile member in translating apparatus are known in the art. Certain difficulties, however, have been experienced in obtaining uni-
10 form cooperative action among the leaves and equally distributed damping effect over the desired area of the vibratile member. Further difficulty has been experienced due to slipping or rotation of the leaves with
15 respect to one another with a resultant loss in the transmission efficiency of the translating apparatus.

An object of this invention, therefore, is to improve the damping of the vibratile element in translating apparatus and increase the efficiency and dependability thereof.

In accordance with the general features of the present invention an acoustic device such as a telephone transmitter is provided
25 with a damping element comprising a plurality of thin leaves formed from flexible strips folded and interfolded with each other in such a manner that alternate leaves are connected together by hinges and the hinges
30 on adjacent leaves are at an angle to one another. This provides a damping book in which the junction points of the leaves are arranged in helical formation and sufficient rigidity is present in the book to prevent any
35 slipping or rotation of the individual leaves.

The damping book of this invention is preferably constructed of thin strips of paper or similar flexible material folded over and over each other in alternate relation to
40 form a book or pile of the desired thickness. After the folding, a hole of a predetermined size and form is punched through the center of the book and the corners of the leaves are stamped or cut to the desired shape.

45 A more complete understanding of this invention will be had from the following detailed description with reference to the accompanying drawing in which

Fig. 1 is a fragmentary cross-sectional
50 view of a telephone hand set having a trans-

mitter embodying the damping element of this invention;

Fig. 2 shows the initial relation of two strips of paper in accordance with this invention from which the damping element
55 shown in Fig. 1 is made;

Fig. 3 represents the expanded strips of paper folded at right angles to one another, and

Fig. 4 shows in perspective the complete
60 unitary damping element of this invention with the leaves extended to show the relative position of the hinges on adjacent leaves.

In a specific embodiment illustrated in
65 Fig. 1 the invention is employed in the transmitter of a hand telephone comprising a handle 10, at one end of which the transmitter casing 11 is mounted. An annular dish-shaped metallic member 12 is threaded
70 to the casing 10 and supports a rigid annular bridge piece 13 having a cylindrical central aperture partially closed at one end by an inwardly extending annular flange 14 which
75 forms a seat for an inverted metallic cup 15 containing a variable resistance material, such as comminuted carbon, 16. The open end of a chamber formed by the flange 14 and the inverted cup 15 is closed by the flat
80 central portion of a diaphragm 17. The diaphragm 17 has a marked natural period of vibration and when acted upon by sound waves of a frequency at or near its natural period, will have a greater response thereby
85 causing resonance peaks in the transmitted speech frequencies. This non-uniform response results in distortion of a signal to be reproduced.

In order to overcome this result and thereby obtain a substantially uniform response
90 for the vibratory diaphragm over the range of frequencies it is desired to transmit, a damping element 18 is interposed between the diaphragm 17 and the annular flange 14. The damping element 18 comprises a plu-
95 rality of leaves loosely connected together to allow free but limited axial displacement of the leaves and serves to close the gap between the carbon containing chamber and the diaphragm 17 to prevent leakage of the carbon
100

particles 16 from the chamber. Since the leaves of the damping book are adjacent the carbon containing chamber, there is a tendency for the carbon particles to filter into the interstices between the leaves of the book and thereby impair the efficient operation of the damping element. It is, therefore, desirable that the number of interstices into which the carbon granules may filter be reduced as much as possible with the necessary number of leaves in the book to provide sufficient damping. It is also desirable that the damping element should have sufficient rigidity to prevent rotative or sliding movement of the leaves with respect to one another. Therefore, the damping element of this invention is made of two similar strips of paper 19 and 20, or other flexible material, or of a single piece of paper having similar strip-like portions at right angles to one another. The two strips 19 and 20 are fastened together at 21 as shown in Fig. 2, and folded and interfolded with one another to form a book, the alternate leaves of which are hinged together at adjacent edges. The hinges on adjacent leaves are at right angles to one another and rotated progressively so that the hinges are in a substantially helical formation, that is, the hinges define the interrupted or broken periphery of a spiral of a diameter equal to the diameter of the individual leaves.

The method of constructing the damping element may be understood more clearly with reference to Fig. 3. When the strips are interfolded, the leaf 22 of the strip 19 will rest upon the end leaf 21 and be hinged thereto along the edge 23; leaf 24 of the strip 20 will be disposed adjacent the leaf 22 and will be attached to the leaf 21 by the hinge 25 which is at right angles to the hinge 23. Similarly, the leaf 26 will be adjacent the leaf 24 and will be attached to the leaf 22 by the hinge 27 which is at right angles to the hinge 25. It will thus be seen that each hinge is advanced 90° in either a clockwise or counter-clockwise direction with respect to the next preceding hinge and that the hinges are arranged, therefore, in a substantially helical formation. The corners of the leaves are cut or trimmed to the desired shape by any suitable means, such as a die in a press and a hole of the required dimensions is punched through the center of the leaves. In a specific form shown in Fig. 4 the completed book comprises a plurality of interfolded substantially annular leaves with successive hinges at right angles to one another. In this figure, the shaded leaves are formed from the strip 20 and the unshaded leaves are formed from the strip 19.

Since one free edge of each leaf, as is clearly shown in Fig. 4, is adjacent the hinge connecting the leaves on either side thereof, the available interstices into which carbon

granules may filter are considerably reduced in number and the damping action of the element is improved. The progressive rotation of the hinges also increases the rigidity of the damping element so that the tendency for the leaves to rotate with respect to one another or slide over one another is eliminated.

Although in the foregoing the damping element of this invention is shown employed in a telephone transmitter, it may also be employed in connection with any vibratile member, for example the diaphragm of a sound receiving device, to efficiently damp the mechanical motion thereof.

In the specific embodiment of the invention shown and discussed hereinbefore, two strips of paper or similar flexible material are shown folded and interfolded. It is to be understood, however, that any number of strips arranged at suitable angles to one another, may be employed without departing from the scope of this invention as set forth in the appended claims.

What is claimed is:

1. A damping element for vibrating devices comprising a book of thin leaves, certain adjacent edges of alternate leaves being connected together by integral hinges successively arranged in helical formation.

2. A damping element for vibrating devices comprising two interwoven sets of thin leaves hinged at alternate edges, the hinges of the two sets being at right angles to one another.

3. A damping element for vibrating devices comprising a plurality of sets of hinged rings interwoven with one another, the hinges of said rings being progressively arranged in helical formation.

4. A damping element for sound translating devices comprising a plurality of thin flexible annular leaves in axial alignment to form a book, alternate leaves being hinged together at adjacent edges, and the hinges on adjacent leaves being disposed at angles to one another.

5. In a sound translating device, a vibratile member, and a damping element adjacent said member, said element comprising a plurality of interwoven axially aligned thin flexible leaves, certain adjacent edges of alternate leaves being hinged together, and the hinges on adjacent leaves being disposed at angles to one another.

In witness whereof, I hereunto subscribe my name this 10th day of April, 1930.

HARRY R. CLARKE.