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J. L. CROUCH

1,717,146

SOUND REPRODUCER

Filed Feb. 16, 1927

FIG. 1.

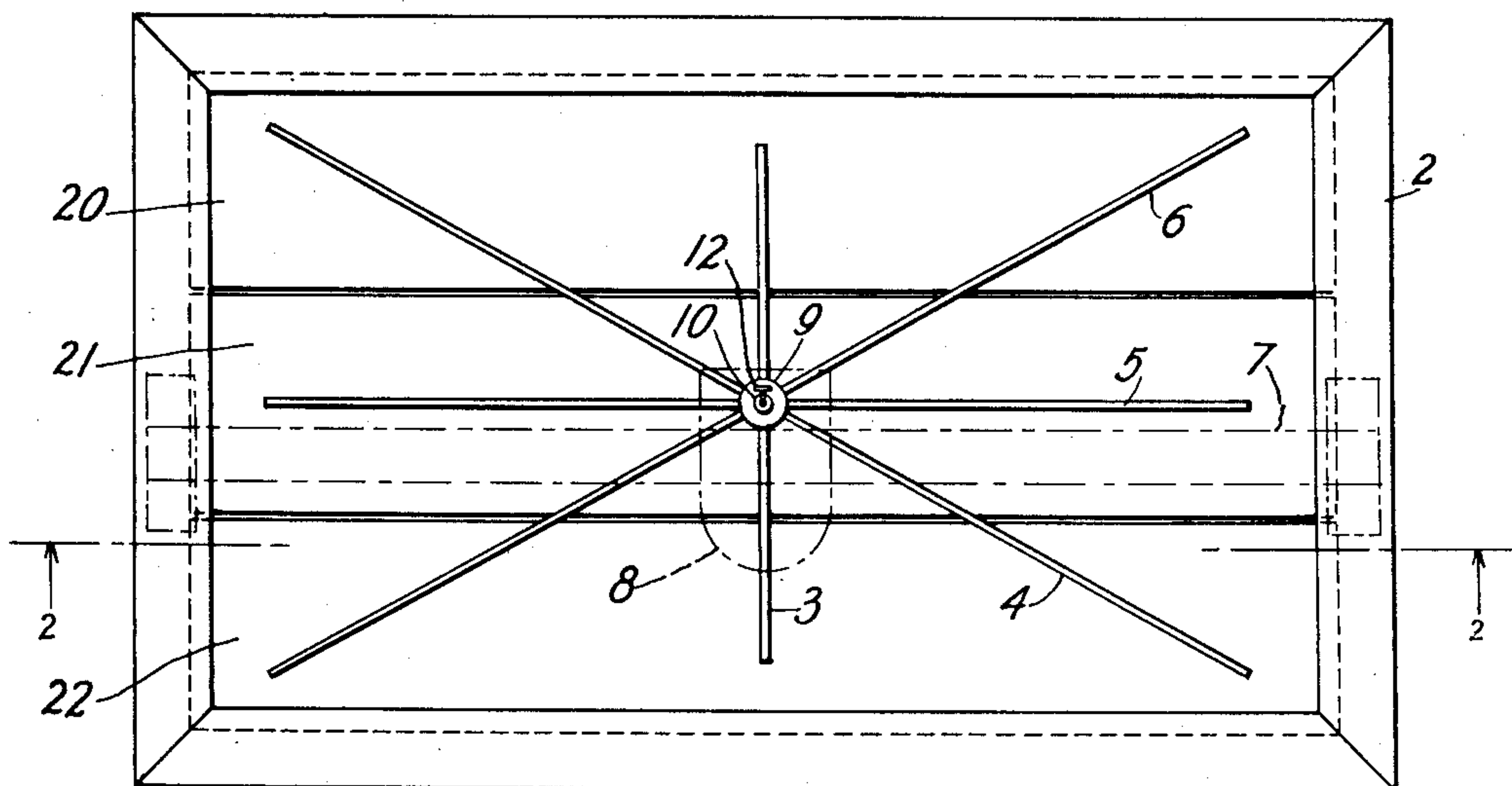


FIG. 2.

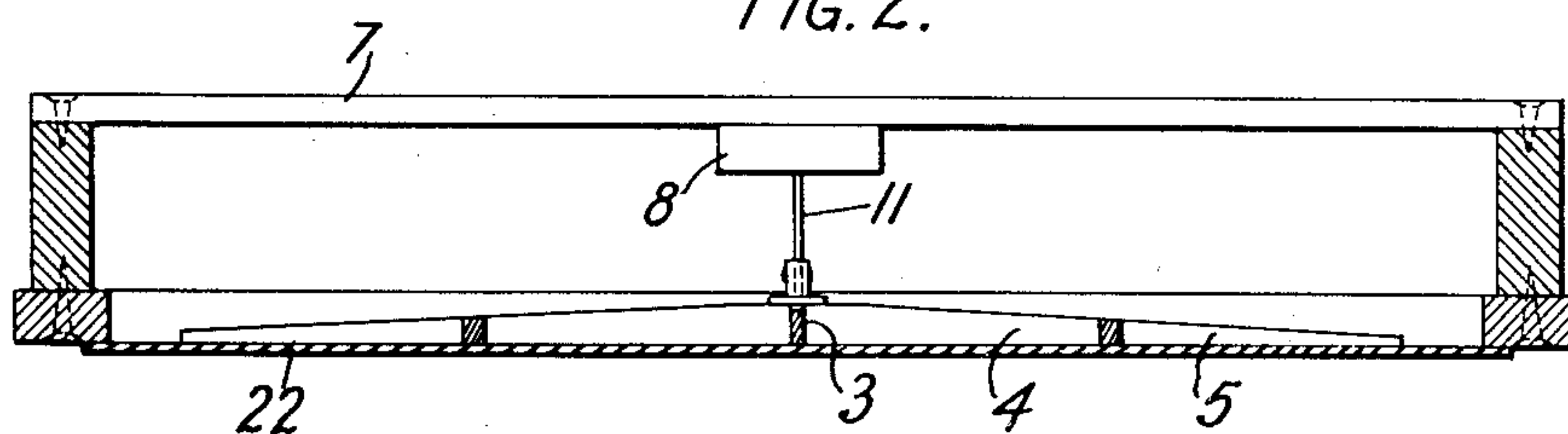


FIG. 3.

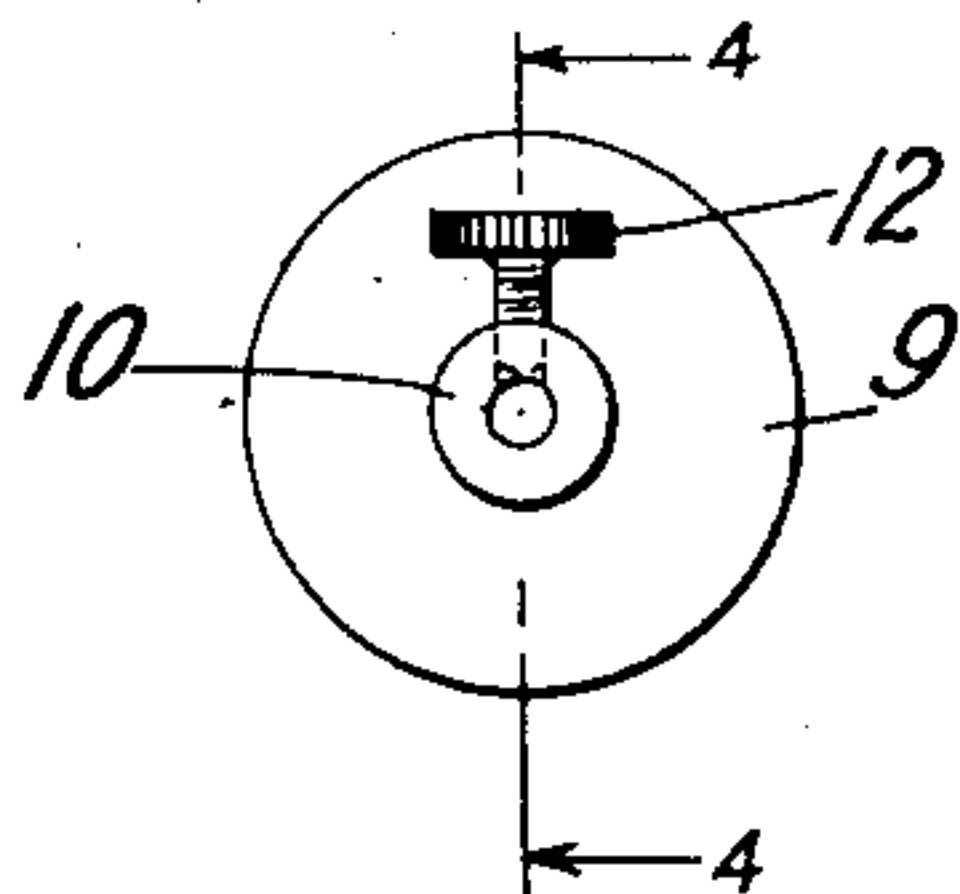
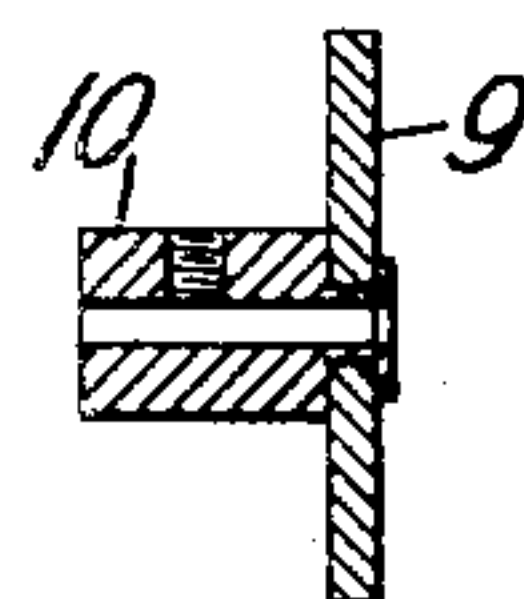


FIG. 4.



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SOUND REPRODUCER.

Application filed February 16, 1927. Serial No. 168,787.

This invention relates to sound reproducers employing large direct acting diaphragms.

An object of the invention is to reproduce efficiently and faithfully all sounds within the audible range.

One feature of the invention resides in constructing a diaphragm of a plurality of sections of thin material arranged in a plane with their adjacent edges slightly out of contact.

Another feature of the invention relates to the use of bridging members in a diaphragm of the foregoing type for connecting the various sections together thereby causing substantially the entire surface of the diaphragm to vibrate as a whole for the lower frequencies.

Another feature resides in rigidly mounting the bounding edge of a diaphragm made up as aforementioned.

The invention may be more readily understood by reference to the following detailed description in which

Fig. 1 is a rear view of one embodiment of the invention,

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1,

Fig. 3 is an enlarged view of means for holding the connecting link,

Fig. 4 is a sectional view of Fig. 3 along the line 4—4.

Similar reference characters designate similar parts in the various views.

In Figs. 1 and 2, there is shown a diaphragm comprising a plurality of sections or panels 20, 21 and 22 of thin material such as metal or fibrous material but preferably of balsa wood. In practice it has been found that balsa wood panels 6" x 36" x $\frac{3}{32}$ " are well suited. These panels may be secured in a frame 2 with glue, nails, screws or the like. The panels are slightly separated at their adjacent longitudinal edges to avoid rubbing but are sufficiently close to prevent the passage of air when the diaphragm is vibrated. A separation of $\frac{1}{32}$ " has been found to give satisfactory results. Angularly disposed bridging members such as 3, 4, 5 and 6 extending over adjacent panels are suitably fixed thereto as by gluing. These members may be tapered and are preferably terminated a short distance from the supports at the edges of the diaphragm so that the energy communicated to the diaphragm by the driving means is dissipated before it reaches said

supports. A supporting member 7 suitably mounted on the frame 2 carries a driving means 8, which may be of any desired type. An example of a suitable type is disclosed in Patent No. 1,365,898 to Edgerton of January 18, 1921.

A member 9, secured to the bridging members such as 3, 4, 5 and 6, carries a hub 10 to which a link or rod 11 connected to the driving mechanism 8 may be secured by the screw 12.

Where a diaphragm is large, it is apt to warp or bend with temperature and humidity changes. Furthermore where wood is used for the diaphragm it is difficult to get large panels of uniform structure. It is for the purpose of overcoming these difficulties met with in practice that the diaphragm is made up of a plurality of panels. Another advantage of using a plurality of panels is that the vibration characteristics of each of them may be controlled. For example, the thicknesses of the various panels may be varied thereby tuning them to any desired frequency.

Balsa wood is light, has a high ratio of stiffness to weight, is substantially homogeneous in structure and for these reasons it is preferred.

Although the diaphragm, as illustrated in the drawing is rectangular in form, it will be understood that it may be of other shape as for example square or elliptical.

If desired the front of the diaphragm may be covered with a fabric, such as tapestry with a suitable design thereon.

It is not desired to limit this invention to the precise details of construction and dimensions herein set forth, as it is obvious that various modifications may be made without departing from the essential features of the invention as defined in the appended claims.

What is claimed is:

1. A sound reproducing diaphragm comprising a plurality of wooden panels arranged in a plane with their adjacent edges out of contact but sufficiently close together to provide a large frictional resistance to the passage of air, whereby said panels act acoustically as a single imperforate panel.

2. A sound reproducing diaphragm comprising a plurality of thin panels of fibrous material arranged in a plane with their adjacent edges separated to avoid rubbing when vibrating, but sufficiently close to prevent the

passage of an appreciable amount of air between the panels.

3. A sound reproducing diaphragm comprising a plurality of thin panels of balsa wood arranged in a plane with their adjacent longitudinal edges slightly separated and means extending across separated portions of said panels for uniting said panels into a unitary structure.

4. A sound reproducing device comprising a plurality of flat panels arranged in a plane with their adjacent edges slightly separated, angularly disposed members attached to said panels, a frame at the outer edges of said panels, and means for securing the outer edges of said panels to said frame.

5. A sound reproducing device comprising a plurality of flat panels arranged in a plane with adjoining edges sufficiently close together to offer a large frictional resistance to the passage of air, angularly disposed and radially extending bridging members for said panels, a driving mechanism and a link connecting said mechanism and the junction point of said bridging members.

6. A sound reproducing device comprising a diaphragm consisting of a plurality of thin panels of balsa wood arranged adjacent each other with their adjoining edges slightly separated, means for rigidly holding the diaphragm at its outer edges, angularly disposed bridging members extending to points near the edge of said diaphragm and means attached to said bridging members for imparting vibrational forces thereto.

7. A sound reproducing device comprising a diaphragm having a plurality of rectangular shaped panels of balsa wood arranged in a plane, a plurality of light ribs uniting said panels together, means for rigidly holding said diaphragm at its outer edges, and means for imparting vibrational forces to said diaphragm.

8. A sound reproducing device comprising a diaphragm composed of a plurality of wooden panels arranged in a plane with their adjacent edges sufficiently close together to offer a large frictional resistance to the passage of air, means extending over a face of said panels uniting them into a unitary structure, a frame about the edges of said diaphragm, and means mounted on said frame for imparting vibrational forces to said diaphragm.

9. A sound reproducer comprising a plurality of thin strips of balsa wood separated from each other and securely held in a suitable frame, in combination with vibration transmitting means to which vibrations are initially imparted and through which said vibrations are transmitted to said strips, said

means being securely fastened to each of said strips.

10. A sound reproducer comprising a plurality of thin strips of balsa wood separated from each other and securely held in a suitable frame, in combination with vibration transmitting means to which vibrations are initially imparted and through which said vibrations are transmitted to said strips, said means being securely fastened to each of said strips, said vibration transmitting means including a plurality of fins crossing said strips and arranged with their edges in engagement therewith.

11. A sound reproducer comprising a plurality of thin strips of balsa wood a suitable frame in which portions of the strips are rigidly held with relation to the frame, in combination with common vibration transmitting means securely fastened to each of said strips, and a source of vibrations securely coupled thereto.

12. A sound reproducer having a diaphragm of balsa wood in substantially its natural state.

13. A diaphragm for sound reproducing devices, comprising a plurality of strips or panels rigidly supported in spaced relation to one another, and vibration transmitting means for transmitting vibrations from a suitable source of vibrations to said strips or panels, said means being secured to said strips or panels and tying them together in a unitary structure.

14. A sound reproducer having in combination, a diaphragm comprising a plurality of thin strips of balsa wood separated from each other, a frame, means for securing said thin strips of balsa wood in the frame, vibration transmitting means securely fastened to each of said strips, a source of vibrations and a connection between said source and the diaphragm to produce vibrations of the diaphragm.

15. A sound reproducer having in combination a diaphragm comprising a plurality of thin strips of balsa wood separated from each other, a frame, means for securing said strips in said frame, vibration transmitting means securely fastened to each of said strips, said vibration transmitting means including a plurality of fins crossing said strips and arranged in engagement therewith, a source of vibrations, and a connection between said source and the diaphragm to produce vibrations of the diaphragm.

In witness whereof, I hereunto subscribe my name this 16th day of February, A. D., 1927.

JAMES L. CROUCH.