July 23, 1935. R. H. HIERS ET AL 2,009,060

SOUND PROPAGATING DIAPHRAGM AND HOOP

Original Filed March 18, 1933

Fig. 1.

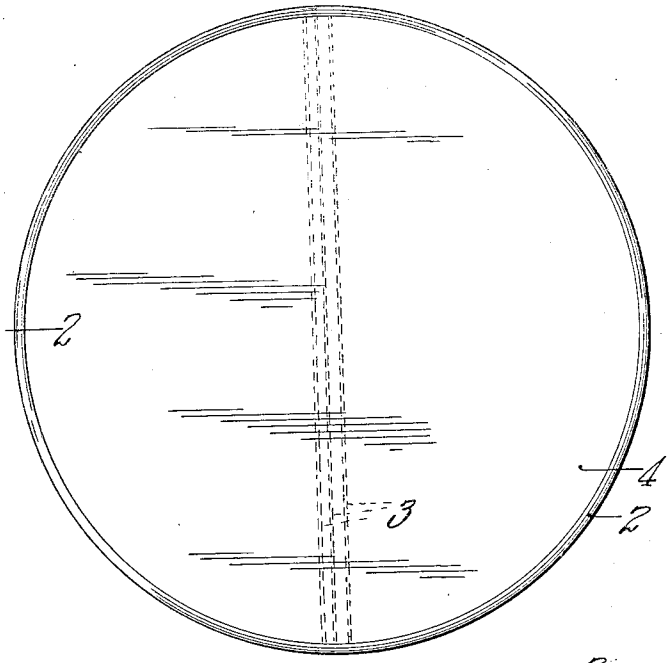
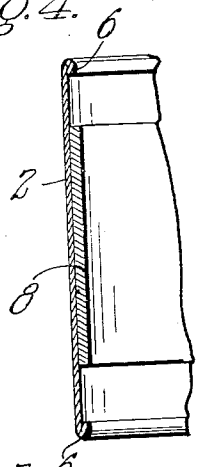


Fig. 4.



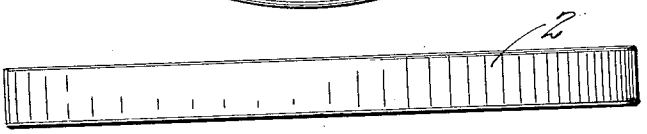


Fig. 3.

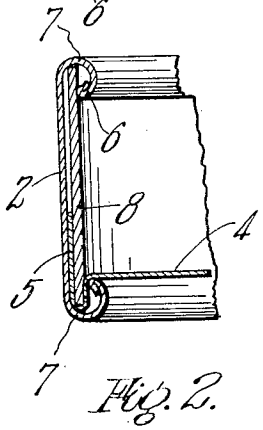


Fig. 2.

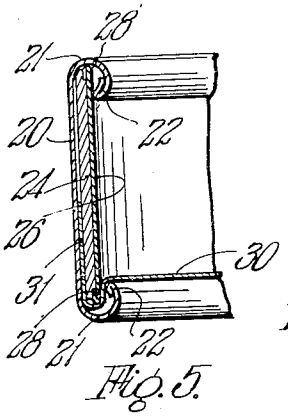


Fig. 5.

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SOUND PROPAGATING DIAPHRAGM AND HOOP

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Renewed October 26, 1934

4 Claims. (Cl. 84—411)

This invention relates to improvements in sound propagating diaphragms and is directed more particularly to improvements in the methods of making certain parts of drums and other sound instruments.

The principal objects of the invention are directed to improvements in the method of making a hoop having a head or diaphragm associated therewith so that the head is supported under tension by the hoop. More in particular, the invention contemplates the provision of a structure wherein the head or diaphragm which is of relatively non-rigid material is secured to a hoop of more rigid material in a taut condition without liability of injury to the head or diaphragm.

In United States Letters Patent 1,783,843, there is shown a method of associating a diaphragm with a hoop but the method disclosed and structure resulting therefrom has been found to be objectionable in many instances principally for the reason that the head is likely to be injured or ruptured by the clamping means so that its function is impaired.

According to this invention, we provide a novel method and structure wherein the diaphragm may be secured to and supported by a hoop under the desired tension or tautness without danger of injury thereto all to the end that the head and hoop or ring may be associated to provide a unitary structure at low cost.

Numerous objects and novel features of the invention will be apparent from the following description of the preferred form thereof which for purposes of disclosure is illustrated in the accompanying drawing wherein:

Fig. 1 is a plan view of a drum hoop or ring having the novel features of the invention associated therewith.

Fig. 2 is an enlarged partial sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a side elevational view of the structure shown in Fig. 1.

Fig. 4 is a sectional view similar to Fig. 2 showing the hoop before it is formed into diaphragm engaging and supporting relation, and

Fig. 5 is a view similar to Fig. 2 showing a modified form of the invention.

Referring now to the drawing more in detail the invention will be fully described. It will be understood that the invention is adapted for broad application but will be described in connection with the securing of a single diaphragm to a hoop. The hoop and its associated diaphragm are adapted for use in connection with any sound producing structure.

In Figure 1 there is shown a cylindrical hoop 2 which serves as a support for and has associated therewith a diaphragm or drumhead 4. This hoop 2 is preferably made from relatively thin metal or the like with its ends suitably overlapped or joined in some manner. As shown in Fig. 4, the hoop, in its initial form, may have both its upper and lower edges, or one of its edges turned as at 6 to provide smooth non-sharp rounding edges. It is at least preferable that the edge adjacent the diaphragm be turned either inwardly or outwardly to protect the head 4. A retaining member 8 which is also cylindrical in form and which is preferably of some more or less yieldable material such as cardboard, thin metal or the like, is provided to fit inside the hoop 2.

The diaphragm or drum head 4 is of some more or less non-rigid material which is resilient when taut, such as calf skin, cloth, paper, sheet-metal or the like, and has its peripheral edge portions inserted between the members 2 and 8. With the edges of the drum-head inserted between the member 8 and body of the hoop the crimped edges 6 of the hoop are rolled inwardly or outwardly. Thus the rounding edges 6 clamp the diaphragm or press on the member 8 and clamp the diaphragm against the main body of the hoop as shown in Fig. 2. Snares such as 3 may be provided adjacent the diaphragm.

The upper marginal edge of the hoop 2 may likewise be rounded so that it abuts the member 8. If desired, sufficient pressure may be employed to cause the upper portion of the member 8 to be pressed against the main body of the hoop.

It will be noted that since the edges of the hoop are rounded at 6 that there is provided a rounding surface which brings up against the member 8 and over which the diaphragm lies. This rounding edge is capable of pressing the diaphragm and other parts together, and of pressing against the main body of the hoop with equal pressure around the hoop and thereby hold the diaphragm under the proper and desired condition of uniform tautness. There are no sharp surfaces or edges impinging the diaphragm which tend to injure or rupture it, and yet the diaphragm is securely clamped to the supporting hoop in such a manner that it is not readily displaced.

It will be appreciated that since the diaphragms are usually made from materials which are relatively thin, that they are susceptible to puncture and rupture when impinged by sharp or rough and uneven edges. It is these possibilities that are entirely obviated by rounding the

edges of the hoop and whereby the diaphragm may be pressed and clamped to the hoop.

The modification of the invention shown in Fig. 5 will now be described. In this form of the invention, like the hoop 2, a hoop 20 has at least its lower marginal edge rounded as at 22. A retaining member 24 is provided which, as in the former case, is cylindrical or ring-like to fit within the hoop 20. A supplemental ring-like member 26 is also provided which may be of relatively rigid material such as metal and at least has its lower marginal edge rounded as at 28.

The member 26 overlies the member 24 and a diaphragm indicated by 30 has its marginal portion extending between the member 20 and the member 24. The edge of the hoop which is rounded presses on the diaphragm 30 and causes it to bear against the member 26. In this way the diaphragm is securely clamped in place under the proper tension and is not only protected against injury by the turned edge of the hoop but is disposed so that it is pressed against the suitably rounded surface 28 of the member 26.

From the foregoing it will be observed that the structure is arranged and adapted to securely clamp the diaphragm to the hoop in such a way that the diaphragm is not likely to be injured as it is or would be where sharp and possibly ragged edges are at the peripheral edges of the hoop.

According to varied forms of the invention, the marginal portion of the diaphragm may extend between the yieldable member 24 and the relatively rigid member 26 or, as indicated at 31, between the member 20 and the cylindrical member thereadjacent. It is a distinctive feature of the invention that the structure may include either the relatively yieldable ring-like member or the relatively rigid ring-like member alone or the two together, as may be desired. While the use of a yieldable retaining member such as 24 tends to enhance the resonant tone of the diaphragm the rigid member 26 reinforces the structure and permits the use of a relatively thin hoop 20, which, as stated, is preferable.

In any event, by means of the invention it is not only possible to properly secure and support the diaphragm under the desired degree of tautness but, when necessary and desired for the purposes of economical manufacture, it is possible to use relatively thinner and more inexpensive material for the diaphragm, since, at the place where it is clamped to the hoop, it is not injuriously affected by the clamping edges of the hoop.

Having described the invention in the form at present preferred, what it is desired to claim and secure by Letters Patent of the United States is:

1. A unitary hoop and diaphragm structure constituting a sound propagating device comprising in combination, a circular hoop member of a certain diameter formed from a band of relatively rigid sheet material of a certain width, the said hoop member having its lower marginal edge turned upon itself to provide a rounded surface and the upper and lower marginal edge portions of the hoop at either side of the main body of the hoop being curved inwardly to provide upper and lower flanges with the marginal edges thereof disposed at a distance from the body portion to provide spaces between said edges and said body portion, a circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively yieldable material of less width than the first-named band and extending around the inside of the first-named band and disposed concentrically thereof with its marginal edges extending into said spaces, and a diaphragm of greater diameter than the first-named hoop member having its marginal edge portions extending downwardly over the said lower flange between the rounded surface thereof and said retaining member and upwardly between said retaining member and the main body of the hoop, the said rounded surface of the hoop member bearing on said diaphragm whereby the marginal edge portions of the diaphragm are clamped by said rounded surface, said retaining member and said main body of the hoop in a sound-propagating relation.

2. A unitary hoop and diaphragm structure constituting a sound propagating device comprising in combination, a circular hoop member of a certain diameter formed from a band of relatively rigid sheet material of a certain width, the said hoop member having its lower marginal edge turned upon itself to provide a rounded surface and the upper and lower marginal edge portions of the hoop at either side of the main body of the hoop being curved inwardly to provide upper and lower flanges with the marginal edges thereof disposed at a distance from the body portion to provide spaces between said edges and said body portion, a circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively rigid sheet material of less width than the first-named band and extending around the inside of the first-named band and disposed concentrically thereof with its marginal edges extending into said spaces, said retaining member having its lower marginal edge turned upon itself to provide a rounded surface, and a diaphragm of greater diameter than the first-named hoop member hav- its marginal edge portions extending downwardly over the said lower flange between the rounded surface thereof and said retaining member and upwardly between said retaining member and the main body of the hoop, the said rounded surface of the hoop member bearing on said diaphragm whereby the marginal edge portions of the diaphragm are clamped by said rounded surface, said retaining member and said main body of the hoop in a sound-propagating relation.

3. A unitary hoop and diaphragm structure constituting a sound propagating device comprising in combination, a circular hoop member of a certain diameter formed from a band of relatively rigid sheet material of a certain width, the said hoop member having its lower marginal edge turned upon itself to provide a rounded surface and the upper and lower marginal edge portions of the hoop at either side of the main body of the hoop being curved inwardly to provide upper and lower flanges with the marginal edges thereof disposed at a distance from the body portion to provide spaces between said edges and said body portion, a circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively rigid sheet material of less width than the first-named band extending around the inside of the first-named band and disposed concentrically thereof with its marginal edges extending into said spaces and having its lower marginal edge turned upon itself to provide a rounded surface, a second circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively yieldable material of less width than the first-named band disposed concentrically of

said hoop member between the main body portion of the hoop and the first-named retaining member with its marginal edges extending into said spaces, and a diaphragm of greater diameter than the first-named hoop member having its marginal edge portions extending downwardly over the said lower flange between the rounded surface thereof and said rigid retaining member and upwardly between said retaining members, the said rounded surface of the hoop member bearing on said diaphragm whereby the marginal edge portions of the diaphragm are clamped by said rounded surface, said retaining members and the main body of the hoop in a sound-propagating relation.

4. A unitary hoop and diaphragm structure constituting a sound propagating device comprising in combination, a circular hoop member of a certain diameter formed from a band of relatively rigid sheet material of a certain width, the said hoop member having its lower marginal edge turned upon itself to provide a rounded surface and the upper and lower marginal edge portions of the hoop at either side of the main body of the hoop being curved inwardly to provide upper and lower flanges with the marginal edges thereof disposed at a distance from the body portion to provide spaces between said edges and said body portion, a circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively rigid sheet material of less width than the first-named band extending around the inside of the first-named band and disposed concentrically thereof with its marginal edges extending into said spaces and having its lower marginal edge turned upon itself to provide a rounded surface, a second circular hoop-like retaining member of less diameter than the first-named hoop member formed from a band of relatively yieldable material of less width than the first-named band disposed concentrically of said hoop member between the main body portion of the hoop and the first-named retaining member with its marginal edges extending into said spaces, and a diaphragm of greater diameter than the first-named hoop member having its marginal edge portions extending downwardly over the said lower flange between the rounded surface thereof and said rigid retaining member and upwardly between said yieldable retaining member and said main body of the hoop, the said rounded surface of the hoop member bearing on said diaphragm whereby the marginal edge portions of the diaphragm are clamped by said rounded surface, said retaining members and the main body of the hoop in a sound-propagating relation.

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