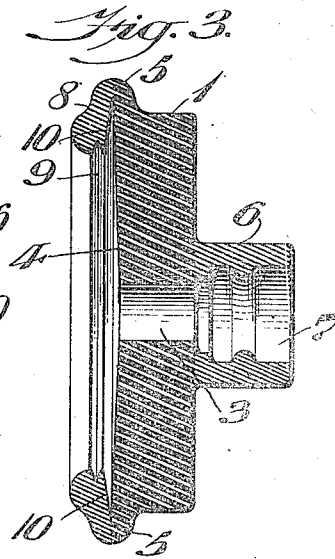
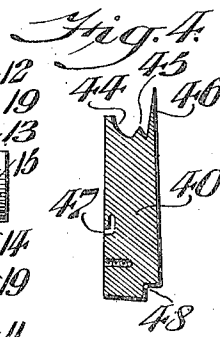
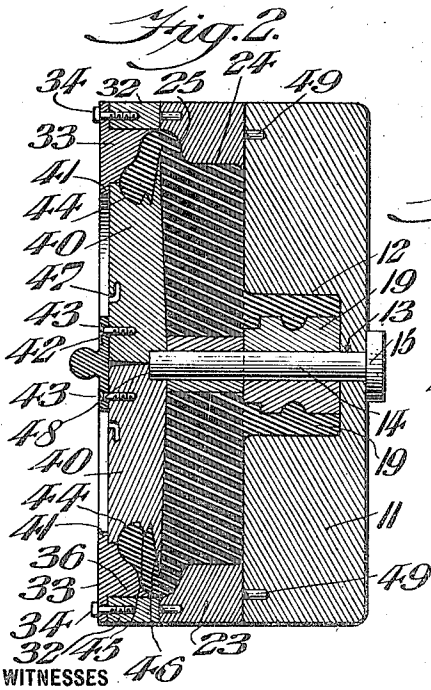
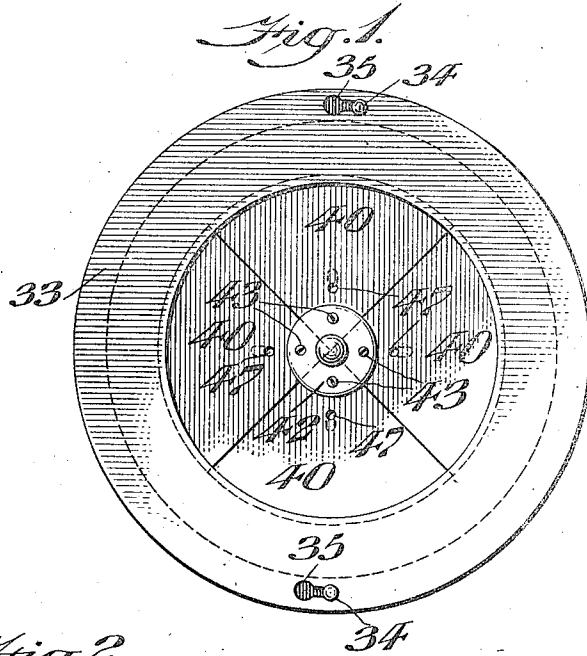


A. D. JONES.  
METHOD OF, AND MOLD FOR MAKING SOUND BOXES.  
APPLICATION FILED JULY 20, 1914. RENEWED JAN. 26, 1916.

1,188,078.

Patented June 20, 1916.

2 SHEETS—SHEET 1.



WITNESSES

*H. G. Dietrich*

*W. F. Nagle*

*Alva D. Jones* INVENTOR  
BY *Wiedersheim & Fairbank*  
ATTORNEYS

METHOD OF AND MOLD FOR MAKING SOUND BOXES.  
APPLICATION FILED JULY 20, 1914. RENEWED JAN. 26, 1916.

Patented June 20, 1916.

2 SHEETS—SHEET 2.



R. F. Nagle.

INVENTOR

BY

Alva J. Jones.

Nedersheim, Paul Banks.  
ATTORNEY

**ATTORNEYS**

# UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

## METHOD OF AND MOLD FOR MAKING SOUND-BOXES.

1,188,078.

Specification of Letters Patent. Patented June 20, 1916.

Application filed July 20, 1914, Serial No. 851,873. Renewed January 26, 1916. Serial No. 74,477.

*To all whom it may concern:*

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Method of and Mold for Making Sound-Boxes, of which the following is a specification.

My invention consists of an improved method of and mold for making an integral sound-box of a plastic material, such as rubber, for a talking machine or similar sound-recording, sound-transmitting, sound-reproducing or other acoustic transmitting or transforming apparatus, in which a vibratory diaphragm is employed.

It further consists of a mold-device in which the several parts of such a sound-box are formed from such plastic material, as rubber, and suitably cured, in separate mold-sections which can subsequently be united to unite and cure the several parts to form one integral box.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mode of carrying out my method and one form of mold employed in carrying out such method, such mode and form of mold being illustrative of one manner in which my invention can be carried out.

In said annexed drawings Figure 1 represents a plan view of the mold embodying my invention. Fig. 2 represents an axial section of the complete finishing mold with the sound-box within it. Fig. 3 represents an axial section of the finished sound-box. Fig. 4 represents a sectional detail view of one of the sector-plates forming the outer closure for the mold. Fig. 5 represents an axial section of the mold-section for the rim or flange of the sound-box. Fig. 6 represents an axial section of the mold-section for the body of the sound-box. Fig. 7 represents an axial section of the mold-section for the neck of the sound-box. Fig. 8 represents a section, on a doubled scale, of the neck of the sound-box and the collapsible core in the same.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawing, and with particular attention to Fig. 3, which represents an axial section of the sound-box mold-

ed according to my invention, the reference numeral 1 indicates a cylindrical body, which is of hard rubber and formed with a central opening, 3, and with a dished recess, 4, which forms a part of the diaphragm recess and is surrounded by a peripheral bead or flange, 5. A neck, 6, of soft rubber is formed upon the center of the rear face of the body and has an axial bore, 7, registering with the central opening of the body, which bore is adapted to fit upon the tone-arm of the talking machine or other acoustic apparatus. A rim or bead, 8, is formed at the peripheral bead of the body to overhang the peripheral portion of the diaphragm-recess, and said rim is formed with an interior groove, 9, into which the periphery of a diaphragm can fit and be secured, and the inner face, 10, of the annular rim forms an overhanging annular wall of the diaphragm-recess. As stated, the body is of hard rubber and the neck and annular rim are of soft rubber, said parts being separately molded and cured and thereupon joined and cured or vulcanized together to form one integral sound-box. While rubber is the preferable material for the box, it is evident that other material possessing the general properties of rubber or its compounds, and capable of being vulcanized or cured to different degrees of hardness and to be integrally united can be used.

The mold is composed of three mold-sections which are first employed separately, as illustrated in Figs. 5, 6 and 7, to separately mold and vulcanize or cure the three component parts of the finished sound-box to the shapes and different hardness required, whereupon the main portions of said mold-sections and the parts therein are placed together, as illustrated in Fig. 2, and the parts joined and vulcanized or cured to form the integral box having parts of different consistencies.

The mold-section, 11, which molds the neck, is illustrated in Fig. 7 of the drawings, and is preferably cylindrical and formed with a central cylindrical mold-cavity, 12, which forms the outer side of the neck, and the outer end of which cavity is closed, with a central opening, 13, in such closed end in which fits a post, 14, having a head, 15, upon its outer end. A cover, 16, fits upon the face of the mold-section, being held in place by suitable clamps, 17, and covers the end of the mold-cavity, having

a central opening, 18, for the post. Truncate sector-shaped blocks, 19, are placed around the post to form with it a collapsible core for molding the bore in the neck, and a locking-block, 20, forming a part of said core has parallel sides and the block, 21, adjoining such locking-block has its side, 22, out of a radial plane and fitting against one side of the locking-block, so that on removing the post, said latter block can be moved inward out of engagement with the configurations of the bore of the neck, after the latter has been molded, and then endwise removed, when the remaining core-blocks may be collapsed and removed.

The mold-section, 23, which molds the body of the sound-box, is illustrated in Fig. 6 of the drawings, and has a large cylindrical mold-cavity, 24, enlarged at one side by an annular trough, 25, in which a part of the bead 5 of the body of the box is formed. A bottom-plate, 26, covers the open bottom of the mold-cavity and has a central post, 27, and a top-plate, 28, having a dished or convex inner side, covers the upper open top of the mold-cavity, said top and bottom plates and the mold-section being held together by clamps, 29. The post extends through an opening, 30, in the center of the top-plate, and a tubular core, 31, fits upon the post to form a portion of the bore in the neck, forming a continuation of the collapsible core of the neck-mold section.

The mold-section illustrated in Fig. 5 has an annular wall, 32, which forms a continuation of the wall of the body-mold section, and a ring, 33, is detachably secured to one edge of said wall by headed bolts, 34, upon the latter engaging keyhole slots, 35, in the ring. The ring has an annular molding, 36, upon its inner face, which fits within the wall and has annular concavities, 37, which mold the rounded outer side of the overhanging bead 8 of the diaphragm-recess of the sound-box. A bottom-plate, 38, is secured by clamps, 39, to cover the bottom of this mold-section, and the top of said section is covered by sector-plates, 40, having their peripheral edges engaging beneath an inwardly-extending flange, 41, extending from the inner edge of the ring. The apices of the sector-plates are detachably-joined by a central plate, 42, secured to the plates by screws, 43, and the peripheral edges of the sector-plates are formed with a concave circumferential groove, 44, and a small-diameter V-shaped rib, 45, and a large diameter V-shaped rib, 46. The outer faces of the sector-plates have L-shaped recesses, 47, or otherwise shaped notches or depressions for the engagement of a pin or other tool for withdrawing the plates. The apices of the inner sides of the sector-plates have rabbets 48, forming a central recess when the plates are assembled, into which the end of the

axial post 14 engages when the entire mold is assembled.

In practice, the mold-sections are assembled and have their mold cavities filled with plastic rubber or whatever material is used, and are thereupon closed by the covers, which, being forced by the clamps, press the material into all parts of the mold-cavities. The filled mold-sections are now placed in suitable vulcanizers to vulcanize the material in the same to the required hardness, the body-portion being cured hard and the neck and rim-portion being cured soft. When the parts are sufficiently cured, the top-cover of the neck mold-section, the top and bottom-covers of the body mold-section, and the bottom-cover of the rim mold-section are removed and the three mold-sections superposed, dowel-pins, 49, and corresponding sockets, 50, as well as the axial post 14, bringing and retaining the sections in alignment. The surfaces of the portions of the box which are exposed by removal of the covers are suitably coated or treated to adhere to each other when the mold-sections are put together, whereupon the complete mold is placed in a vulcanizer and cured to weld the parts together into an integral whole while retaining the relative degrees of consistency or hardness required. The diaphragm cavity of the box will have comparatively hard walls to concentrate the sound-waves, while the soft support for the diaphragm and the soft connection of the box to the tone-arm will prevent all scratchy, rough, chattering or metallic taint of the sound vibrations. As, notwithstanding the different consistencies of the parts of the sound-box, the latter is one integral body of material, there will be no parting of joints or other disintegration of parts of the box. When the entire box is cured, the sector-plates are disconnected and removed, the annular ring and wall are removed from the body-section mold, and the post and the neck-section mold are removed. The collapsible core is collapsed and its blocks removed, and the small core is removed, and the body can be removed from its mold-section.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

It will be seen from the foregoing that by my novel method and apparatus, I am enabled to make a sound box wherein the body portion is hard, and the diaphragm seat and rearwardly extending neck are somewhat softer, which I can attain by the hereindescribed method of semi-curing the body of the box, securing to the semi-cured

body an annular bead of softer material having a diaphragm seat therein, whereby an annular, resilient, integral hinge is formed, the body of said box having the rearwardly extending neck also of softer material, whereby a novel sound box having advantages over the prior art is produced.

So far as I am aware, I am the first in the art to produce a sound box of the character described out of rubber or similar material, having portions thereof of varying degrees of hardness, for the purpose stated, and my claims to my novel method and apparatus are to be construed with the corresponding scope awarded to a pioneer invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The herein described method of forming a sound box body which consists in separately molding a body portion and an outer diaphragm supporting portion, curing said portions to the desired degree of hardness, assembling said portions, and lastly uniting said portions by curing to form a completed sound box body, said diaphragm supporting portion being softer than said body.

2. The herein described novel method of forming a sound-box, which consists in separately molding a body-portion, a neck-portion and a diaphragm-supporting seat-portion, separately curing such portions to the desired consistency or hardness, assembling said several portions, and finally curing such portions to unite in one integral article.

3. The herein described novel method of forming a sound-box, which consists in separately molding portions of such box in separate mold-sections, separately curing such molded portions, each in its mold-section and to its required consistency or hardness, assembling said portions and their mold-sections with the joint surfaces of such portions in contact, and finally uniting such surfaces by curing to form such portions into one integral article.

4. The herein-described method of making a rubber sound box, which consists in semi-curing the body thereof, securing to said semi-cured body an annular bead of softer material, forming within said bead a diaphragm seat, and lastly completing the curing of said body and bead, said bead being semi-cured and said body fully cured and harder than said bead and diaphragm seat.

5. The herein-described method of making a sound box, which consists in semi-curing the body of said box, securing to said semi-cured body an annular bead of softer material having a diaphragm seat therein, and lastly completing the curing of said body and bead, whereby a sound box is produced having a body portion fully cured

and a diaphragm encircling portion semi-cured, the latter being softer than said body portion, and secured to said body portion by an annular, resilient, integral hinge.

6. The herein-described method of making a sound box of rubber or similar material, which consists in semi-curing the body thereof, securing to said semi-cured body an annular bead of softer material, forming intermediate said body and said bead a diaphragm seat, securing a rearwardly extending neck of softer material to said body portion, and lastly completing the curing of said body, bead and neck, said bead and neck being semi-cured and said body fully cured and harder than said bead, diaphragm seat and rearwardly extending neck.

7. The herein described method of making an integral sound box of rubber or the like which consists in curing a body portion and an outer diaphragm encircling portion to the desired degree of hardness and thereafter uniting said portions by curing to form a completed sound box body, said diaphragm encircling portion being softer than said body portion.

8. A mold for a sound box, comprising an annular wall, an annular ring detachably secured to said wall and having an annular molding extending within said wall, and a collapsible plate having its edges engaging said ring and forming with its edges and the annular molding of the same an annular mold cavity and formed with a peripheral rib upon said edge to mold a diaphragm groove.

9. A mold for a sound box, consisting of a body portion, formed with concentric cavities, a collapsible core axial in such cavities, a collapsible plate adapted to enter the open end of such cavity and having a circumferential rib upon its periphery, and a rim-forming ring adapted to be secured to the body-portion to bear against said plate and provided with an annular rim forming molding upon its inner side.

10. A mold for a sound box, comprising an annular wall, an annular ring secured to said wall and having an annular molding extending within said wall, and a collapsible sectional plate having its outer edges engaging said ring and forming with said annular molding an annular mold cavity for the diaphragm retaining portion of the sound box, the bottom of said plate having a central recess therein.

11. A mold for a sound box body comprising a mold section 23, having an annular trough 25 therein, a bottom plate 26 having a central post 27, a top plate 28 and a tubular core 31 surrounding said post.

12. A mold for a sound box, comprising a mold section formed with a cavity closed at its bottom, open at its top and having

a central opening therethrough, a post located in said opening, a cover detachably secured to the face of said mold section, truncate sector shaped blocks surrounding said post and forming with the latter a collapsible core, and a locking block co-acting with said sector shaped blocks.

13. A mold for a sound box, comprising a mold section for forming and containing the body portion of said box, a second mold section for forming and containing the diaphragm encircling portion of said box, detachable closures for covering the open sides of the mold cavities of said mold sections, and alining devices for enabling said mold section and their contents to be placed in juxtaposition after the removal of certain of said closures, so that the uniting of said portions to form an integral sound box may be effected.

14. A mold for a sound box, comprising a mold section for forming and containing the body portion of said box, a second mold section for forming and containing the softer diaphragm encircling portion of said box, detachable closures for said sections for enabling the contents of the latter to be cured to the requisite degree of hardness, and means common to said mold sections for enabling the latter and their contents to be placed in juxtaposition after the removal of certain of said closures, whereby the uniting and subsequent curing of said portions of said box may be effected.

15. In a mold for a sound box, means for separately molding portions of said box in separate mold sections, whereby such molded portions may be separately cured each in its mold section and to its required hardness, means for enabling said mold sections and their contents to be assembled, so that said portions of said sound box are in contact and in proper alinement, whereby said contacting juxtaposed portions are enabled to be united by curing to form an integral

sound box, whose body is harder than the diaphragm retaining portion.

16. A mold for a sound box, comprising two outer mold sections, for forming the softer diaphragm encircling member and the softer neck portion of the box, an intermediate mold section for forming the harder body portion of said box, detachable closures for said mold sections, and alining devices common to said mold sections for enabling the latter and their contents to be juxtaposed to form an integral sound box after the removal of certain of said closures.

17. A mold for a sound box, comprising outer mold sections, for forming the outer portions of said box, an intermediate mold section for forming the harder body portion of said box, a collapsible sectional plate for one of said outer mold sections, and alining devices for retaining the mold sections in assembled position.

18. A mold for a sound box, comprising two outer mold sections, for forming the outer portions of said box, an intermediate mold section for forming the harder body portion thereof, a collapsible sectional plate for one of said outer mold sections, a central alining device for said mold sections, having its end seated in said sectional plate, and outer alining devices for said mold sections.

19. The herein described method of forming a sound box body which consists in separately molding a body portion and an outer diaphragm supporting portion, curing said portions to the desired degree of hardness, assembling said portions, and lastly uniting said portions to form a completed sound box body, said diaphragm supporting portion being softer than said body.

ALVA D. JONES.

Witnesses:

E. HAYWARD FAIRBANKS,  
C. D. McVAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."