April 5, 1932. DE HART G. SCRANTOM 1,852,793

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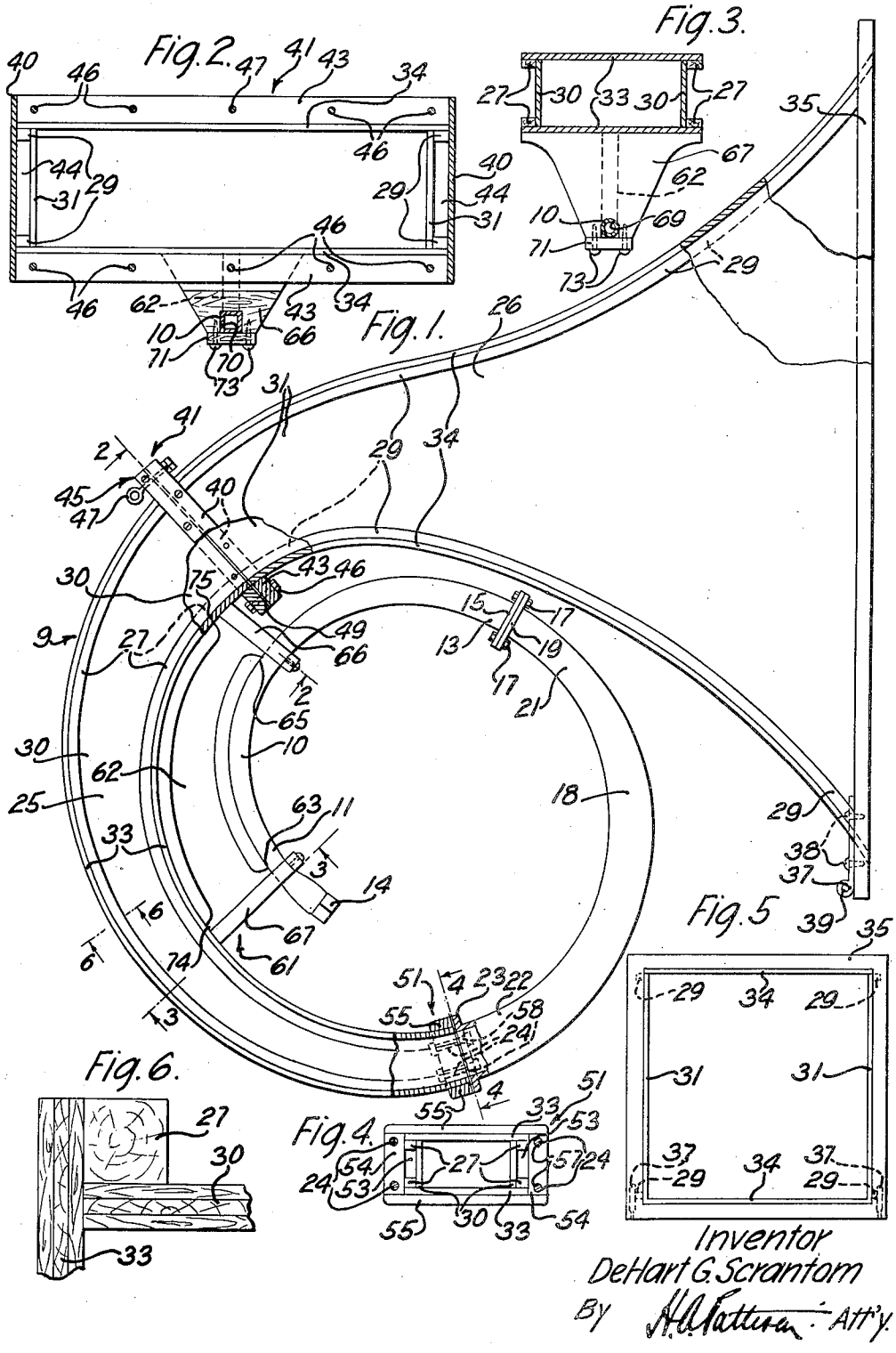
Filed Nov. 24, 1928



Patented Apr. 5, 1932 1,852,793

UNITED STATES PATENT OFFICE

DE HART GRIDLEY SCRANTOM, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

APPARATUS FOR AMPLIFYING AND DISTRIBUTING SOUND WAVES

Application filed November 24, 1928. Serial No. 321,607.

This invention relates to apparatus for amplifying and distributing sound waves and more particularly to horns for augmenting the volume of sound waves transmitted thereto, and methods of producing amplifiers of that type.

Objects of the invention are the provision of a light and compact apparatus for the amplification and distribution of sound waves with a minimum distortion of the tonal qualities of the sound waves, and a simple and economical method of producing such apparatus.

In accordance with these and other objects, one embodiment of the invention contemplates a sound amplifying horn which may be produced by practicing a method which consists in forming wooden supporting strips into a predetermined curved shape to conform to the curve of the edges of a substantially spiral horn having a rectangular cross section. Sheets of three ply wood are then cut to a shape dependent upon the curvature of the supporting strips which are secured to the cut sheets of plywood along the edges thereof to form the sides of the spiral horn. Other sheets of similar plywood are cut to fit the supporting strips in such a manner that in the completed product they form the top and bottom of the horn and overlap the edges of the side pieces and the corner supports with the corner supports on the outside of the horn. The wooden horn may be made in sections and may be attached to a sound reproducing mechanism of any well known type by cast metal throat sections, suitable flanges being provided on the sections to permit such attachment.

These and other objects of the invention will become more apparent from the following detailed description, reference being had to the accompanying drawings, wherein

Fig. 1 is a side elevational view partly in section of a horn embodying the features of this invention and which may be produced by the improved method;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, looking in the diretcion indicated by the arrows;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1, looking in the direction indicated by the arrows;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1, looking in the direction indicated by the arrows;

Fig. 5 is a reduced front elevational view of the mouth of the horn, and

Fig. 6 is an enlarged sectional view taken on the line 6—6 of Fig. 1, looking in the direction indicated by the arrows.

Referring now to the drawings wherein like reference characters designate the same parts throughout the several views, the numeral 9 designates generally a sound amplifying horn comprised of a plurality of sections including an arcuately shaped cast metal throat section 10 having a cross section cylindrical in form at 11 and rectangular in form at 13. The end of the metal section 10 at 11 is provided with a connecting fixture 14 of a well known type for inter-connecting the sections to a reproducing mechanism of any suitable type, not shown. An annular flange 15 on the end 13 having apertures therethrough in which bolts 17—17 may be positioned serves to connect the section 10 to a second cast metal section 18. The section 18 is also arcuately shaped and has a rectangular cross section throughout its entire length and has an annular flange 19 formed thereon to which the flange 15 may be secured by bolts 17—17. The cast metal section 18 has a gradually increasing cross section from the point 21 to the point 22 where a second annular flange 23 is formed thereon to which a plywood section 25 may be attached by nut and bolt assemblies 24—24. The plywood section 25 and a mouth section 26, also made of plywood, are of rectangular cross section, the overall dimensions of which gradually increase from one end of the section to the other end thereof.

In manufacturing the sections 25 and 26, corner strips 27—27 and 29—29, preferably made of rock elm, are bent into a substantially arcuate shape with the grain of the strips following the line of curvature and steam treated and dried in any well known manner while held in that shape so that they will retain the desired shape. Side pieces

30—30 and 31—31 of three ply wood, preferably bass wood of three equal plies each of which is one-eighth of an inch thick, are then cut into sections having their sides curved so that the transverse dimension of each section gradually increases from one end to the other end thereof. The side pieces (one of which 30 together with a corner strip 27 and a top piece 33 to be described hereinafter are shown in Fig. 6) are cut from sheets of three ply bass wood having the grain of the center ply at right angles to the grain of the outer plies and in such manner that the grain of the outer plies will be perpendicular to a projection of the line of curvature of the piece. This is done so that compression of the ply on the inside of the curve and the tension of the ply on the outside of the curve will be equalized, the two outer plies being of equal dimension. It is preferred that plywood of a three-eighths inch overall thickness be used, since it has been found by experiment that a horn of that thickness will have sufficient strength and will have the desired tone quality.

The plywood sheets having been cut to the desired shape, the corner strips are then glued and nailed to the side pieces at the edge thereof and top and bottom pieces 33—33 and 34—34 formed of the same type of plywood as is used in the side pieces of a shape somewhat similar thereto and similarly grained are glued and nailed to the corner strips and the edges of the side pieces in such a manner as to form a spiral chamber of rectangular cross section.

A square wooden frame 35 having its inner surfaces beveled to conform to the shape of the mouth of the horn 9 formed by the side pieces 31—31 and the top and bottom pieces 34—34 is secured to the ends of the corner strips 29—29 and the outer surfaces of the side pieces and the top and bottom pieces. The frame may carry at its corners mounting brackets 37—37 attached thereto by screws 38—38 and having apertures 39—39 through the brackets for receiving mounting ropes not shown.

The small end of the mouth section 26 has a flange designated generally by the numeral 41 formed thereon by cleats 43—43 attached to the top and bottom pieces 34—34 and by filler blocks 44—44 attached to the corner strips and the side pieces. The large end of the section 25 also has a flange 45 formed thereon, in the same manner that the flange 41 is formed on the section 26, to which the flange 45 may be attached by means of nut and bolt assemblies 46—46.

Before connecting the section 25 to section 26 by means of the nut and bolt assemblies 46—46, a rectangular felt washer 49 is placed between the two sections, and after the sections have been connected by the nut and bolt assemblies, strips 40—40 are attached to the ends of the cleats 43—43, the outer surface of the top and bottom pieces 34—34, the filler blocks 44—44 and the corner strips 27—27 and 29—29. An eye bolt 47 is then passed through the two flanges through which a rope, not shown, may be passed to form a three-point support in conjunction with the brackets 37—37.

The end of the plywood section 25 adjacent to the throat section 18 has a flange, designated generally by the numeral 51, formed thereon. This flange 51 is constructed by securing filler blocks 53—53 to the inner surfaces of the corner strips 27—27 and the outer surfaces of the side pieces 30—30 and then attaching cleats 54—54 to the filler blocks 53—53, the outer surfaces of the corner strips 27—27 and the edges of the top and bottom pieces 33—33 and attaching cleats 55—55 to the side pieces 30—30 and the cleats 54—54. Apertures 57—57 are then formed in the flange 51 which align with apertures 58—58 formed in the flange 23 on the throat section 18 through which bolts 24—24 may be passed to secure the plywood section 25 to the throat section 18.

A brace 61 is placed between the throat section 10 and the plywood section 25 and comprises a substantially arcuate shaped wooden member 62 secured to the section 25 at 74 and 75 and which engages the section 10 at 63 and 65. Two cross members 66 and 67 are provided having cylindrical and rectangular cut outs 69 and 70, respectively, in which the section 10 is secured by cleats 71—71 attached to the cross members 66 and 67 by screws 73—73.

A horn constructed in accordance with the hereinbefore described method will have all of the desirable qualities of a solid wooden horn and in addition is more economically manufactured and more easily handled since it is of a lighter construction.

What is claimed is:

1. A method of producing a sound amplifying horn which consists in forming throat sections of metal, forming strips of wood to a substantially arcuate shape, attaching plywood side pieces thereto, and attaching sheets of plywood to the edges of said side pieces to form tapered plywood horn sections of rectangular cross sections, and thereafter attaching the horn sections in sequence to the throat sections.

2. In a sound amplifying horn, a plurality of cold bent plywood sections interconnected in series and having unobstructed all wood inner surface.

3. In a sound amplifying horn, a plurality of plywood horn sections, means for connecting the plywood sections to a reproducing device, and a cushioning washer interposed between the means for connecting the plywood horn section to the reproducing device and between the plywood horn sections.

4. A sound amplifying horn comprising a metal throat section for connection with a reproducing device, and a horn section of cold bent plywood having an all wood inner surface attached to the throat section.

5. A sound amplifying horn comprising a plurality of metal throat sections for connection with a reproducing device, and a plurality of plywood horn sections having all wood inner surfaces and connected in sequence to the throat sections.

6. A sound amplifying horn comprising a plurality of cast metal throat sections for connection with a reproducing device, a plurality of plywood horn sections for connection to the throat sections, and cushioning means interposed between the plywood horn sections and one of the metal throat sections.

7. In a sound amplifying horn, a spirally developed sound chamber comprising a plurality of plywood sections in abutting relation.

8. In a sound amplifying horn, a spirally developed sound chamber having an unobstructed inner surface, the sound chamber comprising plywood members in abutting relation.

9. A method of producing a sound amplifying horn which consists in forming corner strips to a substantially arcuate shape, placing three sheets of wood in respective juxtaposition to form plywood wherein the grain of an exterior sheet lies perpendicular with the grain of an inner sheet, cold bending the plywood to coincide with the conformation of the corner strips, and attaching the plywood thereto to form sides of the horn.

10. A method of producing a sound amplifying horn which consists in forming corner strips to a substantially arcuate shape, attaching plywood thereto to form a side of the horn and simultaneously cold bending the plywood to coincide with the conformation of the strips.

11. A sound amplifying horn having sides composed of cold bent plywood, the grain of one sheet thereof extending perpendicularly to the grain of an adjacent sheet.

12. A sound amplifying horn of angular cross section comprising formed corner strips, and cold bent plywood sides coinciding therewith consisting of a plurality of sheets, the grain of an exterior sheet lying parallel with the line of bending, and the grain of an inner sheet lying perpendicular thereto.

In witness whereof, I hereunto subscribe my name this 14th day of November, A. D. 1928.

DE HART GRIDLEY SCRANTOM.