

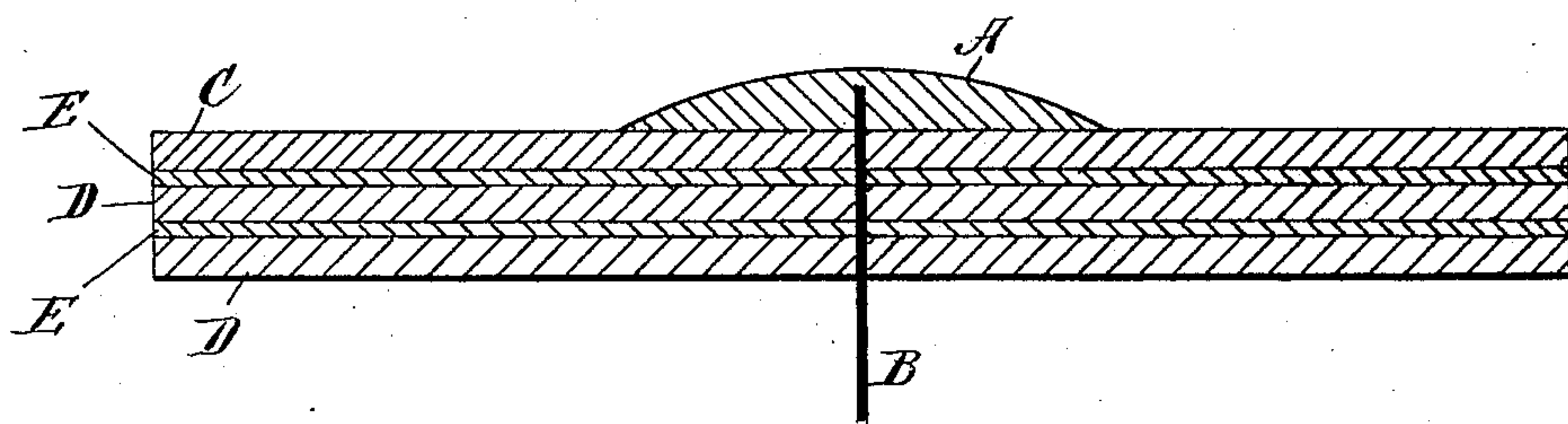
(No Model.)

W. JONES & W. W. REYNOLDS.

ACOUSTIC DIAPHRAGM.

No. 322,295.

Patented July 14, 1885.



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# UNITED STATES PATENT OFFICE.

WILLIAM JONES AND WARREN W. REYNOLDS, OF CASSOPOLIS, MICHIGAN.

## ACOUSTIC DIAPHRAGM.

SPECIFICATION forming part of Letters Patent No. 322,295, dated July 14, 1885.

Application filed December 13, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM JONES and WARREN W. REYNOLDS, citizens of the United States, residing at Cassopolis, in the county of Cass and State of Michigan, have invented a certain new and useful Improvement in Acoustic Diaphragms, which has not been patented to ourselves, nor to others with our consent or knowledge, in any country, and which has not, according to our knowledge and belief, been in public use or on sale in the United States for more than two years prior to this application; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which represents a diametric section of one of our improved diaphragms, the thickness being considerably exaggerated for the purpose of showing the more distinctly the several layers of which the diaphragm is composed.

Our invention relates to acoustic diaphragms of that kind which are used in telephones; and its object more particularly is to provide such a diaphragm which shall, in conjunction with another similar diaphragm and a wire or cord connecting the two, and without the aid of any electric or magnetic apparatus, be capable of transmitting the utterances of the human voice or the sound of musical instruments with perfect clearness to the distance of a mile or more.

To this end it consists in a diaphragm composed of a layer of wood and one or more layers of paper, preferably with the addition of one or more layers of canvas or equivalent material, the whole compacted into a single plate. We will proceed to describe this in detail, and will afterward point out particularly and distinctly what we claim as our invention. We make the diaphragm of the usual disk form and of two or more circular layers closely applied the one to the other, so as to form one perfectly-compact disk. For this purpose we apply a cementing substance between the layers, preferably either glue or varnish; but any means by which the layers can be effectually compacted together—such as compression—will produce a diaphragm equally efficient in transmitting sound. The

layer at the front of the diaphragm nearest to the hearer or speaker, as the case may be, is of wood, ordinarily a veneer from one thirty-second to one-sixteenth of an inch thick, and it is on this layer that we principally depend for reproducing the sound-vibrations, the lesser thickness being the more sensitive. The wood, however, when used alone, gives out a whizzing sound characteristic of the material, which, besides being disagreeable, mingles confusingly with the sound which comes from the voice of the speaker, and thus makes the reproduction indistinct. We reduce this peculiar whizzing sound to practically nothing by adding to the layer of wood a layer of paper, preferably paper made of wood pulp and about equal to the wood in thickness. The diaphragm thus composed does excellent service as a transmitter of speech; but as it is hardly strong enough to bear for any great length of time without detriment, the tension of the connecting-wire, except where the line is comparatively short, we add, to give firmness to the structure, a sheet (corresponding in shape to the other two layers) of canvas or other cloth, whose thickness is not appreciable by ordinary means of measurement. We apply it between the wood and the paper. Rawhide, wire-cloth, or any thin and firm fabric or membrane may be used instead of the canvas.

We find in practice that the best results are attained by adding to the structure, as we have already described it, another layer of canvas or its equivalent and another layer of paper, the latter being also of about the same thickness as the wood.

This the preferable form of our improved diaphragm is the one illustrated in the drawing. In this A denotes the button, of wood, metal, or other suitable material, attached to the front or outer face of the diaphragm by any convenient means. B denotes the wire, fastened at its end to the button and passing through the diaphragm to a similar diaphragm at the other end of the line. C denotes the outer or front layer of the diaphragm, being a disk of wood veneer from one-thirty-second to one-sixteenth of an inch thick. D denotes the two layers of paper, each similar in shape and thickness to



the wood; and E denotes the two sheets of canvas or equivalent material interposed, respectively, between the wood and the first layer of paper and between the two layers of paper.  
5 Of course we apply a suitable mouth-piece to the front of the diaphragm; but as a mouth-piece forms no part of the present invention, and is unnecessary to a perfect understanding of it, we have not shown any mouth-piece in  
10 the drawing.

With the diaphragm which we have illustrated we find by actual use that articulation is perfectly reproduced, and the tones of each individual voice are rendered with purity at  
15 a distance of seven-eighths of a mile from the speaker, there being several sharp bends of the wire between the two termini of the line, and we believe that the apparatus will transmit speech distinctly to a much greater distance.  
20

What we claim as our invention, and desire to secure by Letters Patent, is—

1. An acoustic diaphragm composed of layers of wood, paper, and a strengthening membrane or fabric compacted together, substantially as and for the purpose described. 25

2. The acoustic diaphragm composed of a front layer of wood, two back layers of paper, two layers of a strengthening fabric or membrane arranged, respectively, between the wood 30 and the paper and between the two layers of paper, and a cementing material, substantially as and for the purpose described.

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