

C. F. COOKSON.
ACOUSTIC DIAPHRAGM.
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1,246,552.

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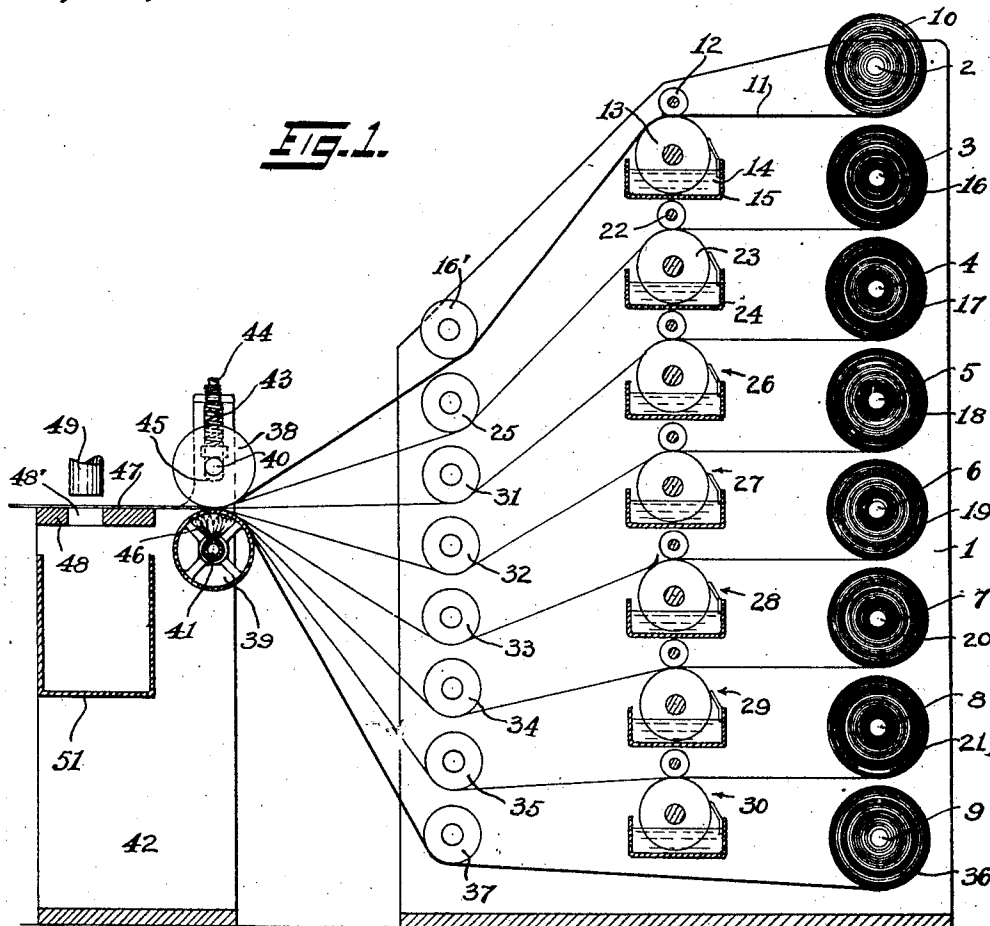


FIG. 2.

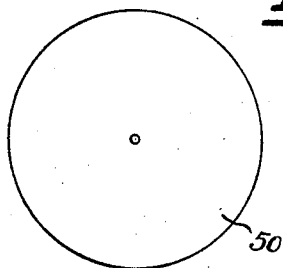


FIG. 3.

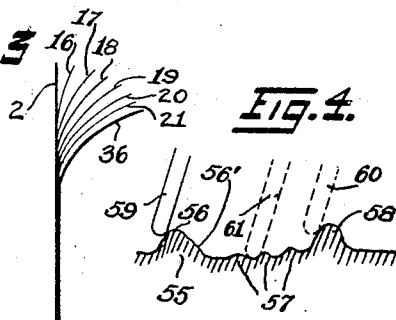


FIG. 4.

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ACOUSTIC DIAPHRAGM.

1,246,552

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To all whom it may concern:

Be it known that I, CLARENCE F. COOKSON, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Acoustic Diaphragms, of which the following is a specification.

This invention relates to improvements in diaphragms and the method of making the same, and more particularly to such a diaphragm for a phonograph constructed of a laminated fabric. Preferably two layers of vellum or other parchment are employed, between which is a plurality of layers of tissue paper having one side coated with an adhesive substance providing means for uniting the layers of tissue and for securing one of the layers of vellum on each side thereof. Diaphragms constructed of metal, mica and paper have been heretofore employed, but it has been long recognized that such diaphragms have a relative slow recovery, which will not permit the needle actuated thereby to contact with all the minute variations of the sound grooves of a record. The present improvement, however, consisting of a laminated fabric diaphragm, has a very rapid recovery causing the needle to contact with every variation of groove on the record, no matter how minute, thereby developing accurate reproduction and a greater resonance.

Another object of the present invention, is to devise a simple and inexpensive method of making the laminated fabric diaphragm.

A still further object of the present improvement, is to devise a phonograph diaphragm which is constructed of cheap material and which may be manufactured at minimum expense.

Other objects and advantages of the present improvement will be set forth in the following description, one embodiment of which is illustrated in the drawings, in which:

Figure 1, is a diagrammatic view of an apparatus for making sheets of laminated fabric and stamping diaphragms therefrom.

Fig. 2, is a side elevation of one of the completed diaphragms.

Fig. 3, is a side elevation of a diaphragm showing the layers of fabric composing it pulled apart.

Fig. 4 is a diagrammatic view of a sound wave on a record and illustrating the dif-

ference in the action of a needle operated in conjunction with a laminated fabric diaphragm and a needle operated in conjunction with a metal, mica or paper diaphragm.

Referring now to the drawings in detail, in which like reference numerals designate similar parts, throughout the several figures; 1 represents a suitable framework at one end of which eight shafts are mounted in spaced relation and one above the other. These shafts are numbered 2 to 9 inclusive on the drawing. A roll of fabric, preferably vellum, 10 is revolvably mounted on the shaft 2, the free end of which is passed between a roller 12, and a roller 13, which latter roller has its lower portion arranged to dip within an adhesive substance 14, carried within a suitable tank 15, the said rollers and tank being mounted within the framework 1. The end of the vellum 10 is then passed beneath a guide roller 16 mounted in the framework 1 and thence fed to a pressing machine, hereinafter to be described.

Six rolls of tissue paper numbered 16 to 21, inclusive, are revolvably mounted on the shafts 3 to 8, respectively, the ends of the tissue paper 16 being passed between contacting rolls 22 and 23, the roller 23 dipping within an adhesive substance carried within a receptacle 24, the said rollers 22 and 23, and receptacle 24 similar to and arranged directly beneath the receptacle 15. The end of the tissue paper 16 is then led beneath a guide roller 25 and thence to the pressing machine. The other five rolls of tissue paper have their free end passed through similar devices for coating their under surface with an adhesive substance, these devices being numbered 26 to 30, which operate upon the tissue paper rolls 17 to 21, respectively. The ends of these rolls of tissue paper are also led beneath guide rolls numbered 31 to 35 respectively and thence to the pressing machine. A second roll of vellum 36 is revolvably mounted on the bottom shaft 9, the free end of which does not pass through an adhesive coating device but directly beneath a guide roller 37 and thence to the pressing machine.

The free ends of all the sheets of tissue paper and the end of the sheets of vellum are drawn together one on top of the other and passed between two rolls 38 and 39 revolvably mounted upon shafts 40 and 41, carried in a framework 42. It will be noted

that all the layers of tissue paper are arranged one on top of the other and between the layers of vellum, and that the under surface of the sheet of vellum 2 and of all the sheets of tissue are coated with the adhesive substance 14 applied thereto by means of the applying devices heretofore described.

The sheets of tissue and vellum upon passing through the rolls 38 and 39 are pressed together by spring tension accomplished by means of springs 43 strained between set screws 44 and the shaft 40 which is vertically movable in a slot 45. Heat is applied to the laminated sheets by means of a suitable heating medium 46 contained within the roller 39. Upon leaving the rollers 39 and 40 the laminated sheets have been all secured together by the adhesive substance and the said adhesive therebetween dried. The unitary structure 47 then passes between a female die 48 having a plurality of openings 48' therein and a plurality of cored male dies 49 the cores of which are the desired size of the diaphragm. The male dies 49 are forced downwardly by any suitable means, entering the openings 48' in the female die 48 cutting out a plurality of completed diaphragms 50, which drop within a collection receptacle 51.

The adhesive substance used within the coating devices may be gum, resin, paraffin wax, shellac, varnish or any resinous gum.

Diaphragms constructed of metal, mica or paper have in practice demonstrated that they have what is known as a "slow recovery". This means that the needle upon being moved and released by a sound groove will not be returned quickly to its original position by the diaphragm for contact with the next portion of the sound wave of the groove.

In Fig. 4 a portion of sound wave is illustrated at 55 which has a large curve 56, a number of small curves 57 and another large curve 58. A needle 59 is illustrated as just leaving the large curve 56. When this needle is controlled by a mica, metal or paper diaphragm, upon being moved by the curve 56 will recover so slowly that the small waves 57 will be skipped in the rapid passage of the record and the needle strikes the second large sound wave 58 as is illustrated in dotted lines at 60.

When the needle 59 is controlled by a laminated diaphragm, however, upon being struck by the large curve 56 will be returned to its original position so quickly by the diaphragm that it will slide down the slope 56' of the large curve 56 and pass over all the small curves 57 as is illustrated in dotted lines at 61.

The laminated diaphragm will interpret all the "phrasing" of the notes which the

metal, mica or paper diaphragms will skip entirely due to their "slow return".

I claim:

1. A diaphragm for use in sound transmitting, receiving, recording, or reproducing apparatus, comprising a plurality of interposed layers of relatively thick and relatively thin fabric homogeneously secured together into a composite single sheet, the two outer layers being thicker than the inner layers.

2. A diaphragm consisting of two layers of vellum, a plurality of layers of tissue paper therebetween, and an adhesive substance uniting the vellum and tissue.

3. A diaphragm consisting of two layers of vellum, a plurality of layers of tissue paper therebetween, and an adhesive substance applied to one side of the vellum and tissue paper for uniting them.

4. A diaphragm for use in sound transmitting, receiving, recording, or reproducing apparatus, comprising interposed layers of relatively thick fabric and layers of relatively thin fabric, the thin fabric being of a different material than the thick, and an adhesive substance applied to one surface of each of the layers for securing them together.

5. A diaphragm consisting of two layers of relatively thick fabric and a plurality of layers of relatively thin fabric therebetween, and an adhesive substance uniting the said thick and thin layers of fabric.

6. A diaphragm consisting of a plurality of interposed layers of vellum and tissue paper secured together.

7. A diaphragm consisting of two layers of relatively thick fabric and six layers of relatively thin fabric therebetween, and an adhesive substance uniting the layers.

8. A diaphragm consisting of two layers of vellum, six layers of tissue therebetween, and an adhesive substance uniting the vellum and tissue.

9. A diaphragm consisting of a plurality of interposed layers of vellum and tissue paper and an adhesive substance for uniting them.

10. A diaphragm consisting of a plurality of interposed layers of vellum and tissue paper and an adhesive substance applied to one surface of the vellum and tissue for uniting them.

11. A diaphragm consisting of vellum and tissue paper secured thereto.

12. A diaphragm consisting of layers of vellum and layers of tissue paper secured thereto.

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