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W. G. KNOX ET AL

1,733,608

PHONOGRAPH NEEDLE

Filed Aug. 8, 1928

FIG. 1

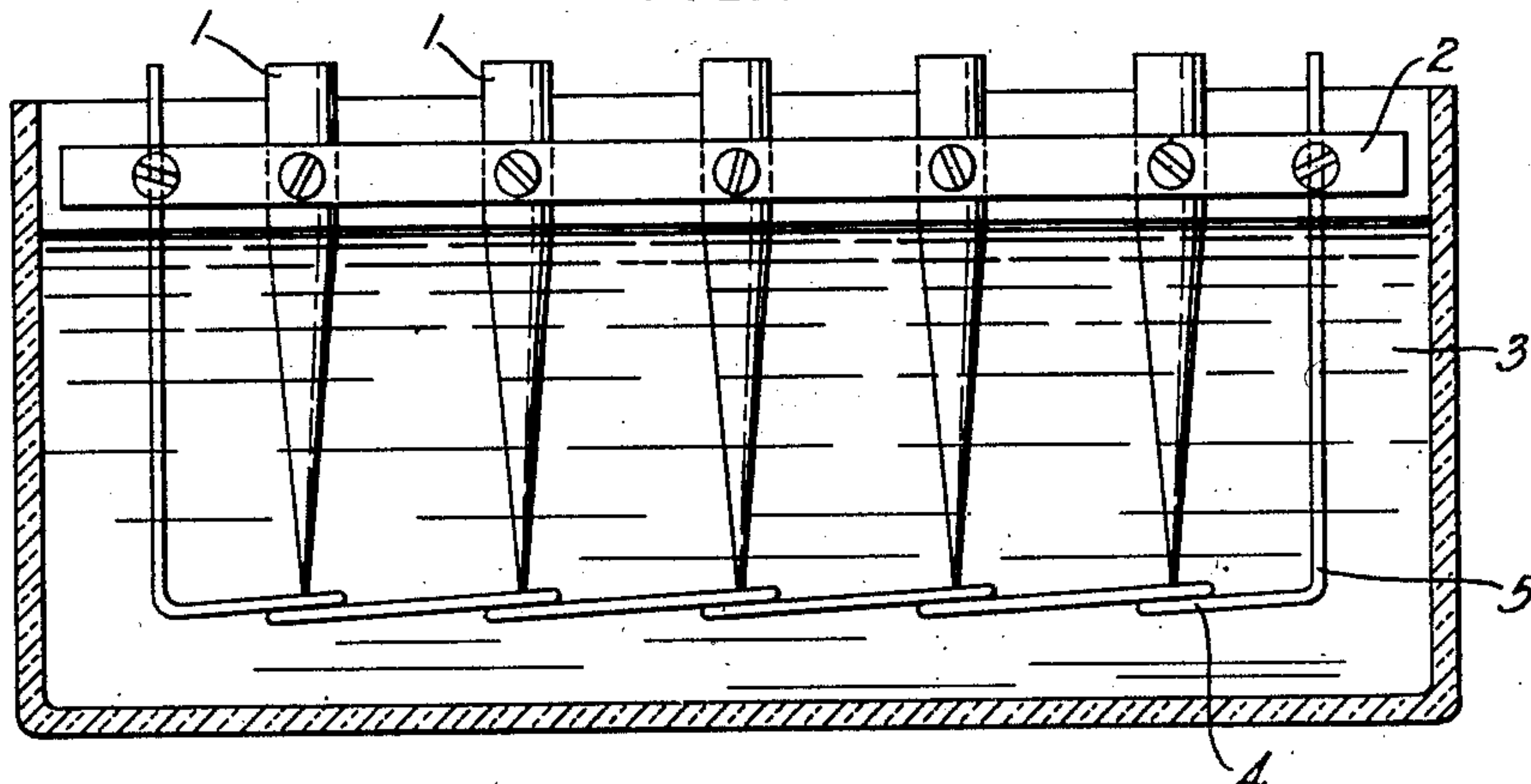


FIG. 2

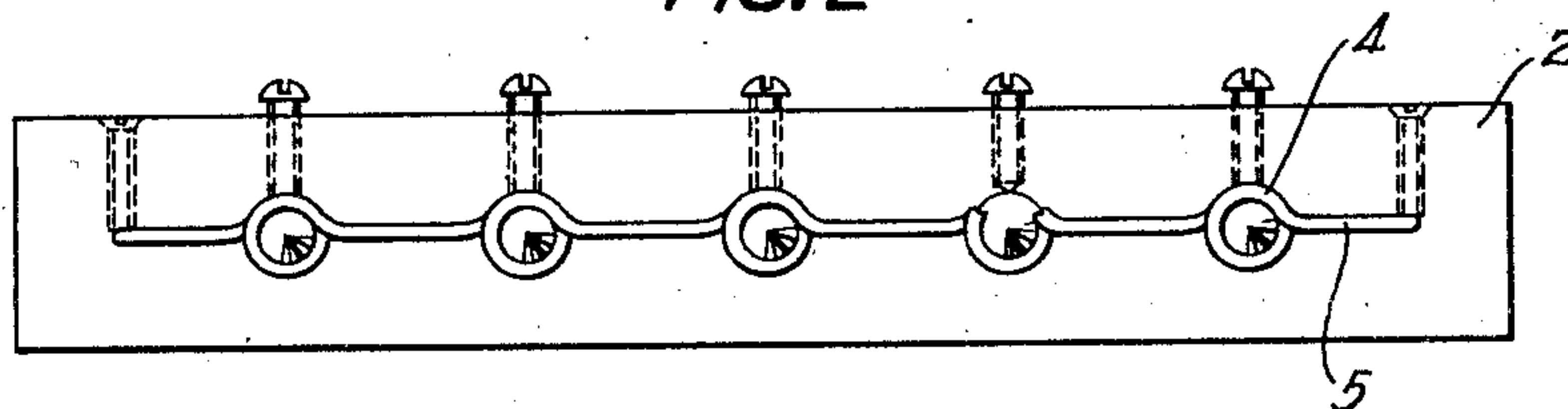


FIG. 3

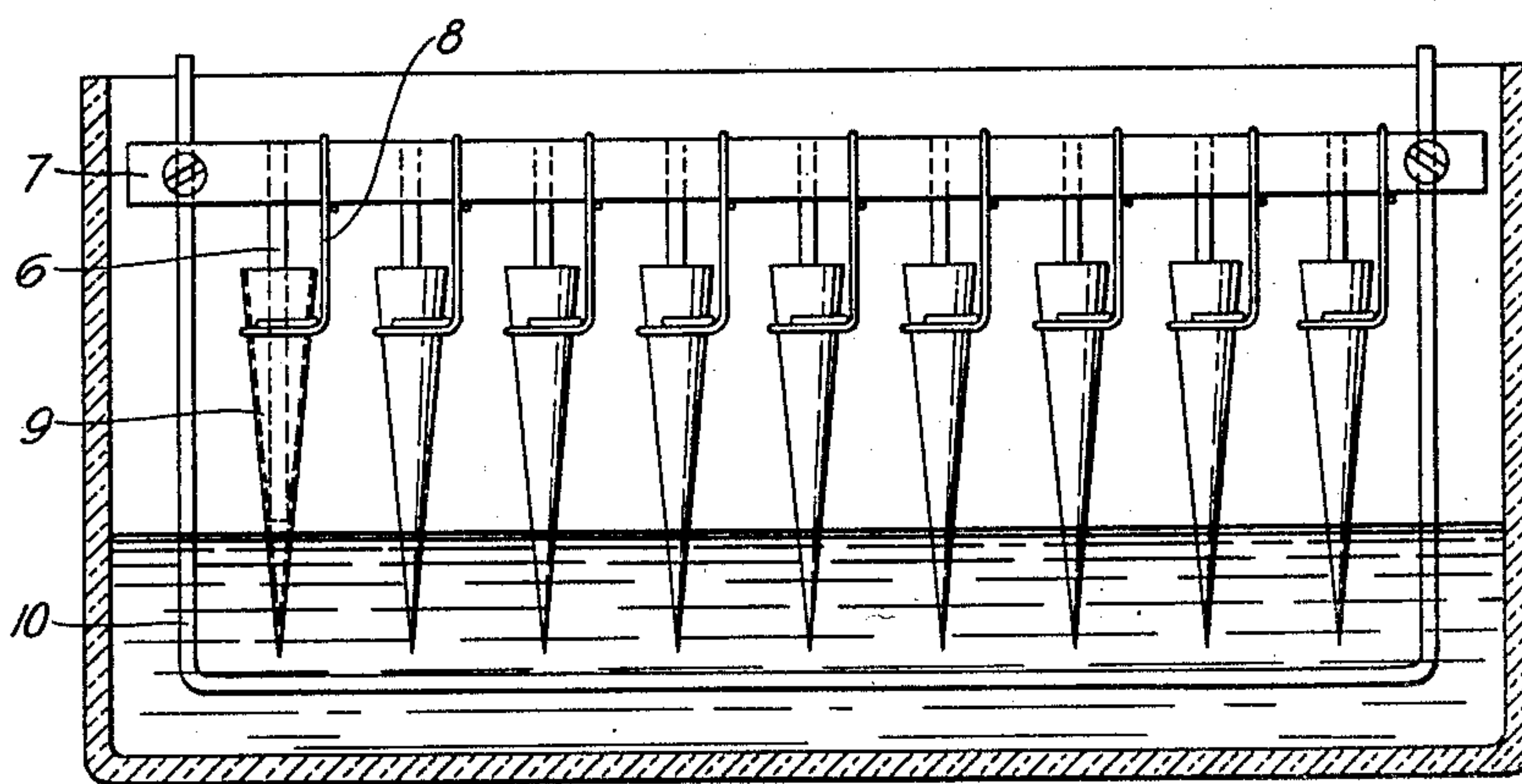


FIG. 4



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PHONOGRAPH NEEDLE

Application filed August 8, 1928. Serial No. 298,257.

This invention relates to phonograph needles and more particularly to methods of and means for electroforming a special type of such needles.

5 It is the object of this invention to provide a needle suitable for use with a reproducer which must respond faithfully to very small applied forces.

10 The features which particularly distinguish the needle of the present invention from those commonly used in the art are its unusual length and very high ratio of stiffness to mass.

15 According to this invention a needle of this kind may be conveniently manufactured by electroplating a thin coating of nickel on a suitably proportioned conical mandrel and then stripping off the nickel cone so deposited. To prevent burning or treeing 20 during the plating process the needle point is protected by a guard ring of wire electrically connected to the needle. The point of the cone is properly contoured to fit the record grooves and then a thin coating of chromium is deposited to make the needle semi-permanent. The other end of the needle 25 may be fitted with a threaded plug or other means suitable for attaching the needle to the reproducer.

30 In the drawing Fig. 1 is a side view showing a rack carrying several mandrels in the plating bath:

Fig. 2 is a detail view of the guard rings indicated in Fig. 1;

35 Fig. 3 is a side view of the cones immersed in the chromium bath; and

Fig. 4 shows a completed needle, according to the process of this invention.

40 A plating bath which has been found suitable for the purpose of this invention is that known as the Madsen nickel bath which is described by Dorsey in "Industrial and Engineering Chemistry", for November, 1927, at page 1219. In the present case this bath 45 is operated preferably at a temperature of from 45° to 50° C. and the pH is maintained at 5.6 by adding sulphuric acid or nickelous hydrate as required.

50 The mandrels used in this process must be treated before immersion in the plating

bath to prevent the deposited nickel from adhering to them. This may be done in various ways such as by the selenium treatment disclosed in U. S. Patent 1,359,972, granted to T. A. Edison, November 23, 1920, 55 by reversing the current for a few seconds as described in British Patent 275,221 or by buffing the mandrel on a soft cloth wheel using a suitable grease such as tripoli compound and wiping off all the visible grease 60 to leave a very thin film upon which a poorly adherent coating of nickel may be plated.

Referring now to Fig. 1, a number of mandrels such as 1, 1 having been treated in one of the ways outlined above, are secured to 65 rack 2 and immersed in the Madsen bath 3 to a depth of about 1½", as indicated. The guarding or shielding rings 4 are preferably about ¼" inside diameter and may be made from a single length of No. 14 gauge 70 bare copper wire 5, as shown in Fig. 2. With this arrangement and a plating current of about one ampere per mandrel suitable cones of about 2 mils thickness at the base and about 4 mils near the point are obtained. 75 These cones are readily removed from the mandrels by burnishing them on a steel wheel.

Before the chromium plating is applied to the points they are ground to the proper contour for engaging record grooves. Each cone 80 9 is then fastened on a peg 6 of the rack 7 by a piece of soft copper wire 8, as shown in Fig. 3. After cleaning the points and preparing the surface to be plated in any well 85 known manner, such as by the use of the alkali electrocleaner and the Madsen cleaning procedure, the cones are ready for the chromium bath.

The Sargent bath containing 250 grams per 90 litre of chromic acid and four grams per litre of chromium sulphate has been found satisfactory. Lead anodes (not shown) are used on either side of the rack 7 and plating is continued for six hours at a current of about 95 1½ ampere per cone, with the cones immersed to a depth of about ¼". This results in a coating of chromium about two mils thick at the needle point. A straight piece of No. 23 gauge copper wire 10 spaced about 1/8" from 100

the points as shown in Fig. 3 has sufficient guarding action in this case.

These needles are then cut to the proper length and a threaded plug 11 is fitted into the base of each to provide a convenient means of attaching it to the reproducer, as shown in Fig. 4.

Although this method has been described in detail and with reference to a particular application, it is obvious that many modifications may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. The method of making a thin hollow cone which consists of electroplating metal on a suitably shaped mandrel and guarding the point of the mandrel during the plating process with a conductor electrically connected to the cone.

2. The method of making a phonograph needle which consists of electroplating a cone of metal on a suitably shaped mandrel, stripping the cone from the mandrel, contouring the point of the cone to fit a record groove and adapting the base of the cone for attachment to a phonographic device.

3. The method of making a phonograph needle which consists in electroplating a thin cone of nickel on a suitably shaped mandrel, stripping the cone from the mandrel, contouring the point of the cone to fit a record groove, plating chromium on the point of said cone and adapting the base of the cone for attachment to a phonographic device.

4. In the art of electrodepositing metal on an electrode the method of manufacturing a hollow conical phonograph needle which consists of treating said electrode to cause imperfect adhesion of the deposited metal, depositing a coating of metal on the electrode the thickness of the coating at the point of the electrode being determined by the proximity of a guarding member electrically connected to said electrode.

5. The method of making a phonograph needle which consists of depositing metal in the form of a cone on a mandrel, the thickness of the deposit at the point of said cone being governed by a guarding conductor electrically connected to the mandrel, stripping the cone from the mandrel, contouring the point to fit a record groove and chromium plating the contoured point.

In witness whereof, we hereunto subscribe our names this 6th day of August, 1928.

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