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W. C. JONES

1,762,991

ELECTROMAGNETIC REPRODUCER OR RECORDER

Filed July 14, 1927

FIG. 1.

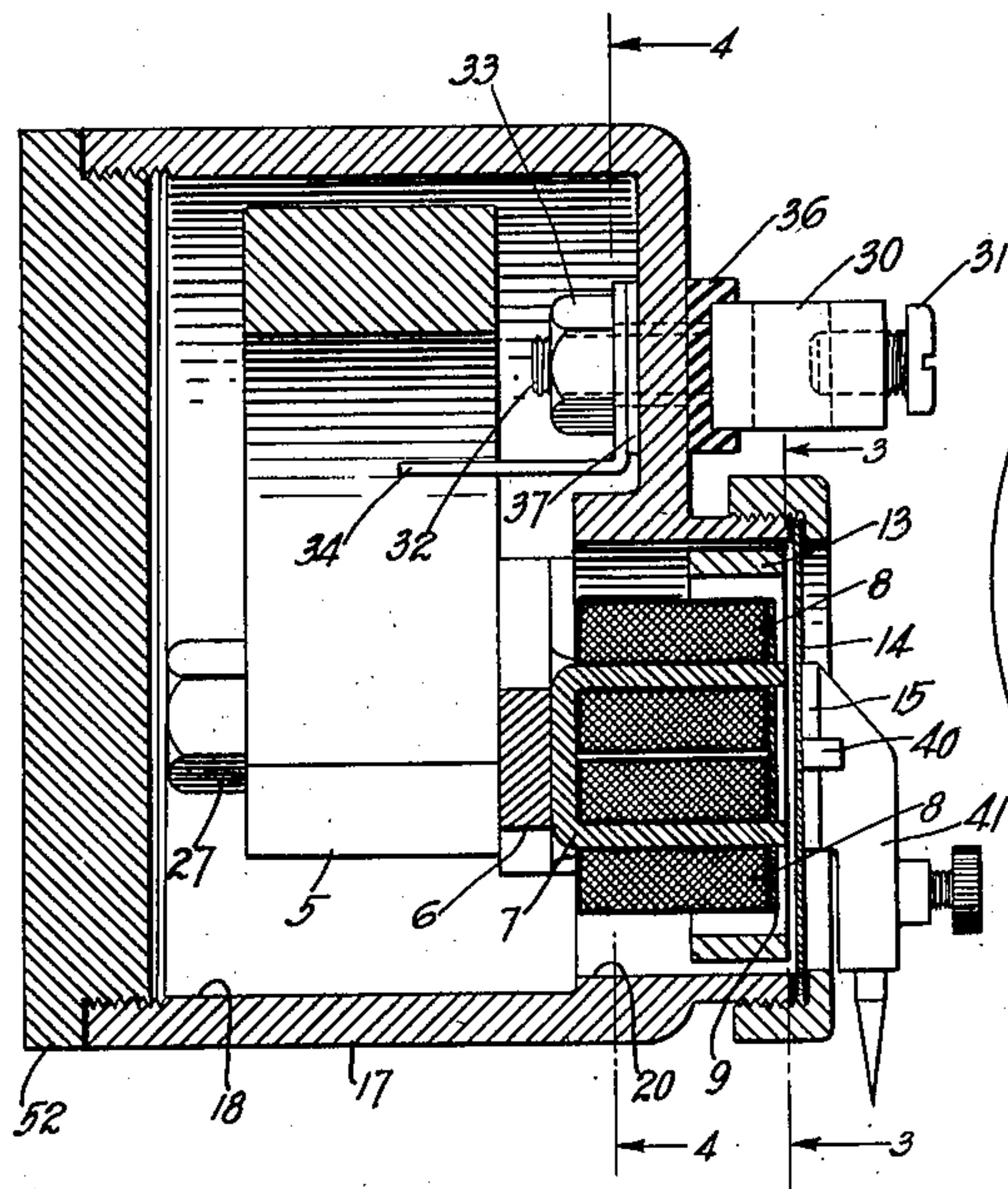


FIG. 2.

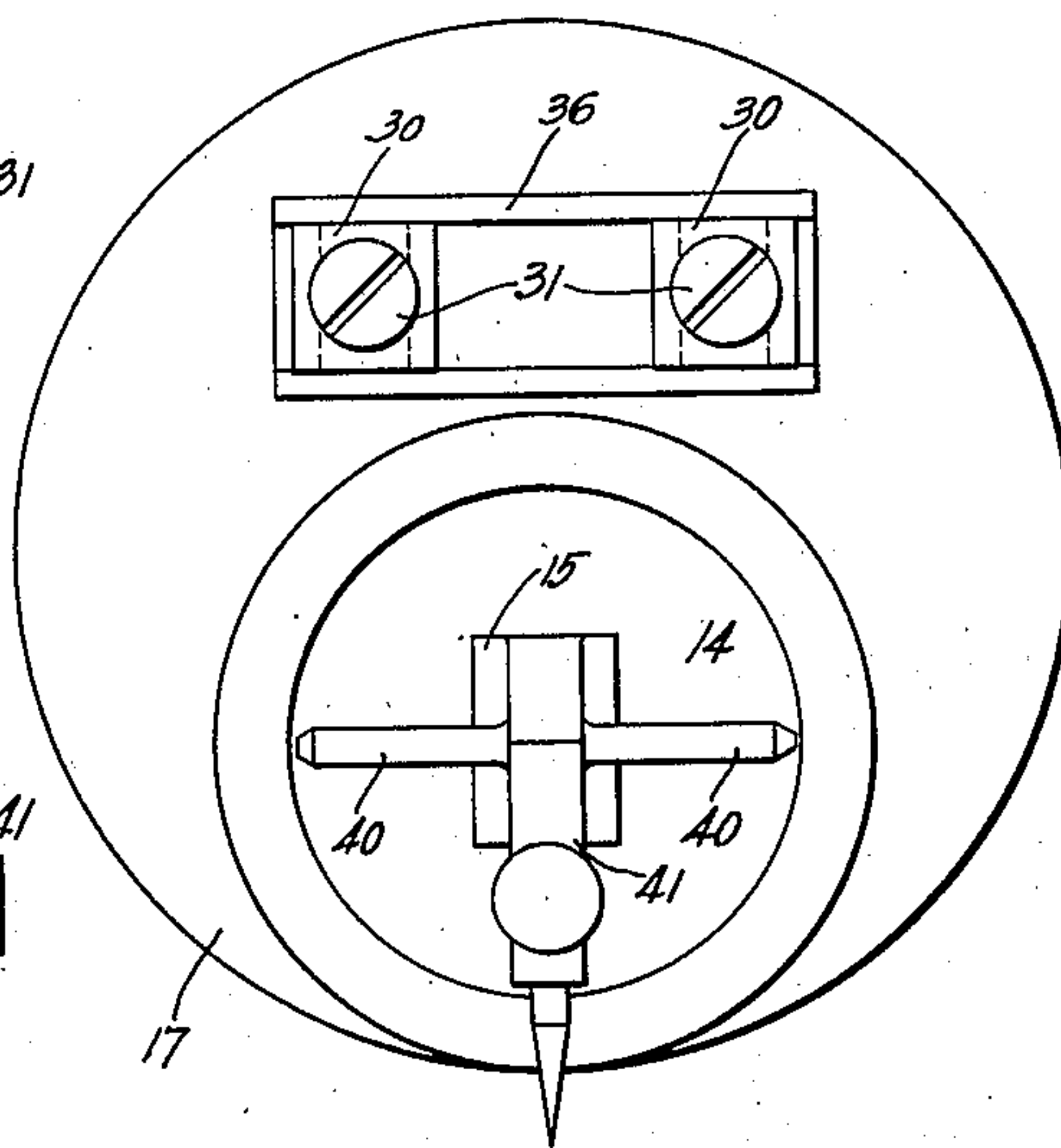


FIG. 4.

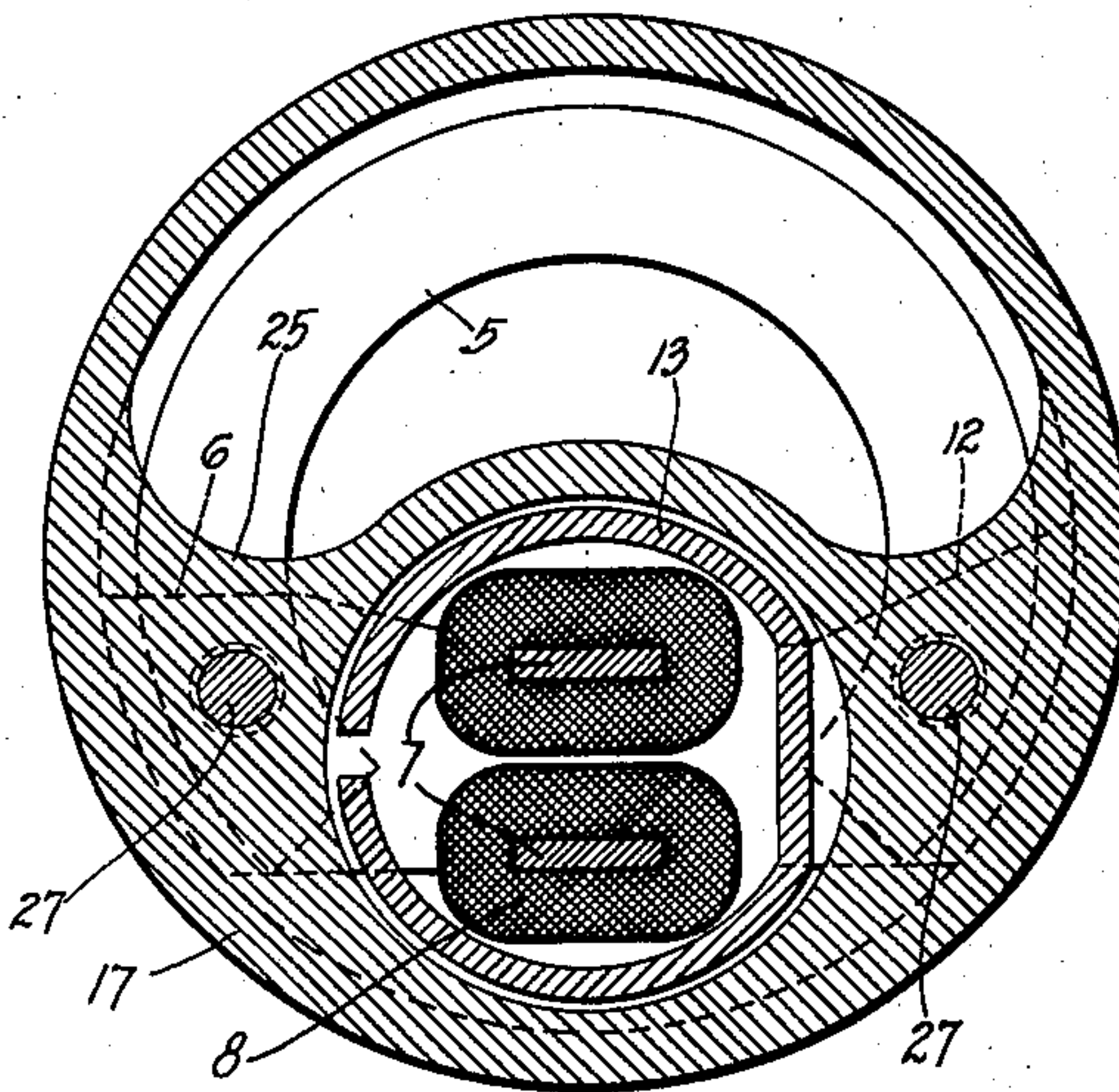
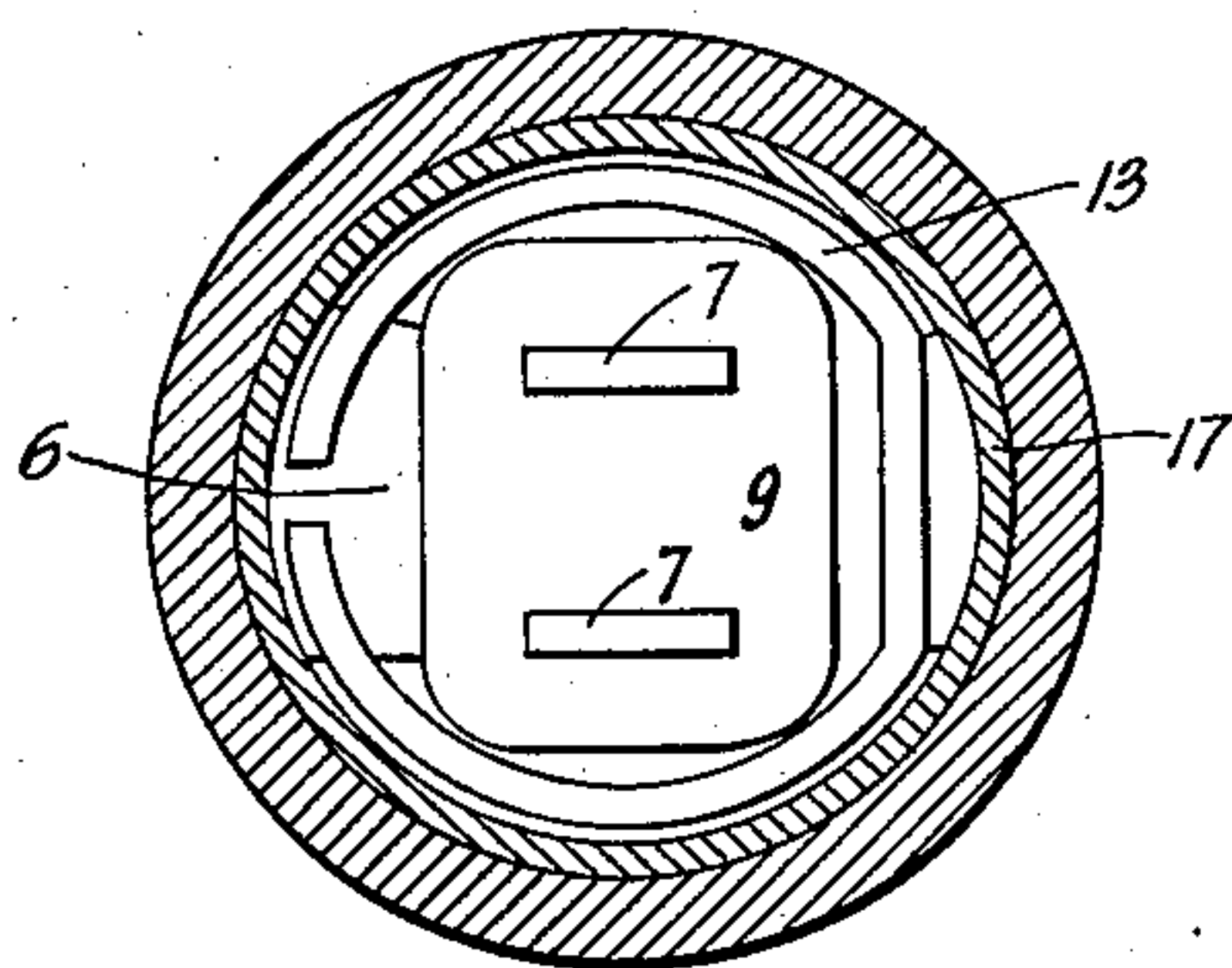


FIG. 3.



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ELECTROMAGNETIC REPRODUCER OR RECORDER

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This invention relates to electromagnetic sound reproducing devices and particularly to a type of sound reproducer in which the mechanical vibrations are damped by means of a viscous medium acted upon by the movement of two relatively movable surfaces in a container of the viscous medium.

The object of the invention in general is to provide a structure of the above type which is compact, easily manufactured and efficient in operation.

According to the features of this invention the magnet system comprises a permanent magnet of the horseshoe type, each leg of which carries an extension, one being adapted to support energizing windings, the other constituting a return path for the magnetic flux. The entire magnet system is housed in a casing which also contains the viscous medium constituting the vibrational damping means.

In the drawings illustrating this invention, Fig. 1 is a sectional view of the assembly;

Fig. 2 is a plan view of the assembly;

Fig. 3 is a sectional view taken upon line 3—3 of Fig. 1; and

Fig. 4 is a sectional view taken upon line 4—4 of Fig. 1.

As shown in the drawings, the magnet system comprises a permanent magnet 5, semi-circular in shape. Secured to one pole of the permanent magnet is an angular extension 6 carrying at its free end a U-shaped extension constituting the cores 7, 7 of an electromagnet, the windings of which are indicated at 8, 8. The windings 8, 8 are secured in place on the cores by means of a spool head 9. Secured to the other pole of the permanent magnet is a second angular extension 12, the upper or free end of which is provided with an annular shaped portion 13 which surrounds the upper ends of the windings 8, 8 in juxtaposition to a diaphragm 14, carrying an armature 15 in operative relation to the pole pieces of the electromagnet and the annular extension 13. The annular extension 13 provides a return path for the magnetic flux.

Enclosing the magnet system is an annu-

lar casing 17 comprising a large annular chamber 18 for housing the permanent magnet and a smaller annular chamber 20 provided with a seating surface for the diaphragm 14 which is clamped thereto by means of a clamping ring 21 having threaded engagement with the exterior surface of the smaller annular chamber 20. The annular casing 17 is preferably formed of cast or drawn material of a non-magnetic character, such as aluminum, and is provided with a thickened portion 25 provided with screw threaded apertures to receive clamping bolts 27, 27 which extend through the permanent magnet 5 near the ends thereof to secure the angular extensions 6 and 12 to the pole pieces and to clamp the structure in the casing.

A terminal block 30 carrying screw terminals 31, 31 is secured to the upper face of the casing 17 by means of threaded bolts 32, 32 extending through the wall of the casing to receive nuts 33, 33 which also serve to clamp soldering terminals 34, 34 to the assembly. The terminal block 30 is insulated from the wall of the casing by means of an insulating block 36 and insulating washers 37, 37.

The armature 15 carried by the diaphragm 14 is rectangular in shape in its portion adjacent the pole pieces of the electromagnet but is provided with transversely extending arms 40, 40 and a stylus carrying projection 41. The arms 40, 40 extend at right angles to the stylus carrying projection 41 for a distance substantially equal to the unrestricted area of the diaphragm 14 and serve to stiffen the diaphragm against flexure in a direction at right angles to the normal movement of the armature in response to the operation of the stylus on the record, but do not appreciably limit the flexing movement of the diaphragm in a direction parallel to the axis of the movement of the stylus.

The device is of a type in which viscous material is moved laterally of the adjacent faces of the diaphragm 14 and the electromagnet in order to produce a damping effect upon the armature vibrations. For this

purpose the enclosing casing or housing is filled with such viscous material to a point where, in the normal operating position of the device, the material will entirely fill the smaller chamber 20.

5 A removable screw threaded plate 52 is adapted to close the larger end of the casing and to permit easy access to the interior of the casing for adjustments of the magnet system or replenishment of the damping fluid.

10 All of the joints are made oil tight by suitable finish of the adjacent surface or by means of gaskets, not shown.

15 What is claimed is:

1. In a reproducer in combination a magnet system comprising a permanent magnet, an electromagnet carried by one leg of the permanent magnet and an extension carried by the other leg of the permanent magnet and constituting a return path for magnetic flux, a vibrating stylus operated armature, viscous material for damping the vibrations of the armature by lateral movement of the viscous material with respect to the armature and a housing enclosing the magnet system and containing the viscous damping material.

2. In a reproducer, a permanent magnet, soft iron pole pieces mounted upon one leg of the permanent magnet, a ring shaped extension mounted upon the other leg of the permanent magnet and surrounding the free ends of the soft iron pole pieces, a vibrating stylus operated armature carried in operative relation to the soft iron pole pieces, windings on said pole pieces, fluid damping means, and a housing enclosing the parts of the magnet system and partially filled by the fluid damping material.

3. In a reproducer in combination, a magnet system including a permanent magnet and polar extensions from each leg of the permanent magnet, a housing for the magnet system, a vibrating stylus operated armature supported by the housing and viscous material for damping the vibrations of the armature contained within but only partially filling the housing.

4. In a reproducer in combination a permanent magnet, an electromagnet having a U-shaped core, a housing comprising a large cylindrical portion surrounding the permanent magnet and a smaller cylindrical portion surrounding the electromagnet, and a vibrating armature supported upon the smaller cylindrical portion of the housing and adapted to pivot between the poles of the U-shaped electromagnet.

60 In witness whereof, I hereunto subscribe my name this 11th day of July, A. D. 1927.

WARREN C. JONES.