April 7, 1931. P. A. ROBBINS 1,799,322

SOUND REPRODUCING MECHANISM

Filed May 17, 1929

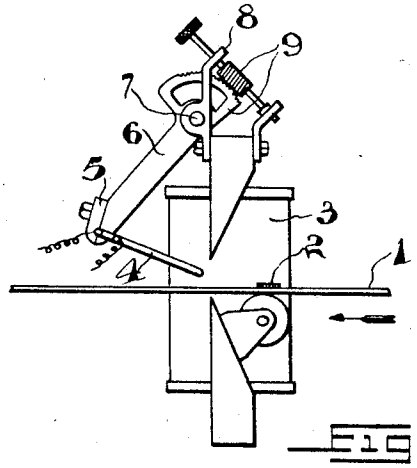


Fig. 1.

Fig. 5.

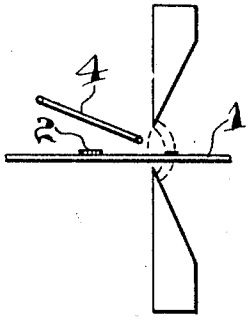


Fig. 4.

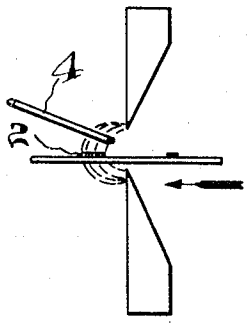


Fig. 3.

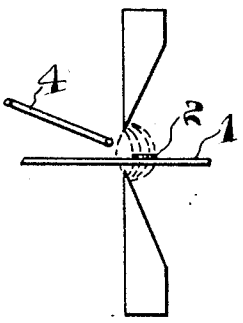


Fig. 2.

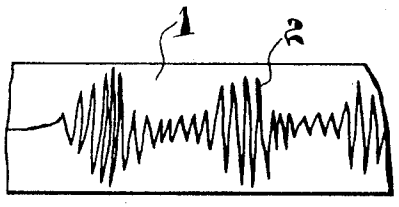
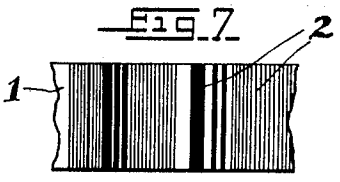


Fig. 6.

Fig. 7



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UNITED STATES PATENT OFFICE

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SOUND-REPRODUCING MECHANISM

Application filed May 17, 1929. Serial No. 363,952.

In my co-pending application No. 363,951, of even date herewith, I disclosed means for reproducing sound utilizing an undulating sound trace on a moving strip to shift a magnetic flux laterally of the strip to thus cut the turns of an electric conductor to induce a current therein varying similarly to the undulations of the sound trace.

My object in the present application is to devise means for similarly inducing an electric current utilizing a sound trace adapted to shift the magnetic flux lengthwise of the strip.

I attain my object by producing a concentrated magnetic field through which is moved a strip having a sound trace formed thereon adapted to shift the magnetic flux longitudinally of the strip as the latter moves through the magnetic field. A coil, having its turns at one side parallel to the surface of the strip and extending transversely of the strip through the magnetic field, has an undulatory current induced therein as the magnetic flux is shifted back and forth.

The invention is hereinafter more fully described and is illustarted in the accompanying drawings in which

Fig. 1 is a side elevation of apparatus constructed in accordance with my invention;

Figs. 2, 3, 4 and 5 side elevations of part of the same showing the distortion of the magnetic field due to the passage of the sound record;

Fig. 6 a plan view of part of a sound record adapted for use with my invention; and

Fig. 7 a plan view of the sound record illustrated in Figs. 1 to 5.

Referring particularly to Fig. 6, 1 is a flexible strip of material such, for example, as used in kinematographic apparatus which usually, when the device is used in connection with such apparatus, will bear a series of pictures. On this strip is formed a sound trace 2, usually by the application of paramagnetic material thereto. This sound trace may take any known form provided there is a difference in the distribution of the material lengthwise of the film which will distort a magnetic field through which the strip may be passed in a direction lengthwise of the strip. Such a trace is illustrated diagrammatically in the drawing.

Referring particularly to Figs. 1 to 5 of the drawings, 3 is an electro-magnet preferably formed with pole pieces of knife edge form, the pole pieces being located close together at opposite sides of the strip 1. A coil of wire 4 is secured by a clamp 5 to an arm 6 pivotally mounted at 7 on a stationary part 8, which is shown as secured to the pole piece of the magnet 3. A worm and quadrant adjustment 9 is provided whereby the arm 6 may be adjusted to vary the position of the coil lengthwise of the strip 1. The clamp 5 provides means for adjusting the coil in a direction perpendicular to the strip.

Figs. 2 to 5 of the drawings show diagrammatically how the lines of force in the magnetic field are shifted by the passage of the sound trace. These lines of force moving relative to the turns of the coil 4 generate an undulatory electric current in said conductor which may be suitably amplified and reproduced as sound waves.

The intensity of the currents induced in the coil 4 will depend upon the intensity of the disturbance of the position of the magnetic flux by the sound trace.

What I claim is:

1. Sound reproducing apparatus comprising a magnet having its poles positioned close to one another; a strip adapted to move lengthwise through the magnetic field between the poles, said strip having a paramagnetic sound trace formed thereon adapted, as the strip moves, to shift the magnetic flux back and forth lengthwise of the strip; and a coil having its turns at one side parallel to the surface of the strip and extending transversely of the strip through the magnetic field, so that a current will be induced therein by the movements of the magnetic flux relative thereto.

2. Sound reproducing apparatus comprising a magnet having its poles positioned close to one another; a strip adapted to move lengthwise through the magnetic field between the poles, said strip having a paramagnetic sound trace formed thereon adapted, as the strip moves, to shift the magnetic flux

back and forth lengthwise of the strip; a coil having its turns at one side parallel to the surface of the strip and extending transversely of the strip through the magnetic field, so that a current will be induced therein by the movements of the magnetic flux relative thereto; and means for adjusting the position of the coil relative to the magnetic field.

3. Sound reproducing apparatus comprising a magnet having its pole faces parallel and positioned close together; a ribbon of non-magnetic material designed to move lengthwise of itself through the magnetic field between the pole faces, said ribbon having a sound trace of paramagnetic material formed thereon, said sound trace providing a series of paramagnetic markings along the length of the ribbon adapted to vibrate the magnetic flux back and forth lengthwise of the ribbon as the ribbon moves; and a coil inductively related to the magnetic field and having its turns at one side parallel to the surface of the ribbon and extending transversely of the ribbon through the magnetic field, so that a current of electricity will be induced therein by the movements of the magnetic flux relative thereto.

4. Sound reproducing apparatus comprising a magnet having its pole faces parallel and positioned close together; a ribbon of non-magnetic material designed to move lengthwise of itself through the magnetic field between the pole faces, said ribbon having a sound trace of paramagnetic material formed thereon, said sound trace providing a series of paramagnetic markings along the length of the ribbon adapted to vibrate the magnetic flux back and forth lengthwise of the ribbon as the ribbon moves; a coil inductively related to the magnetic field and having its turns at one side parallel to the surface of the ribbon and extending transversely of the ribbon through the magnetic field, so that a current of electricity will be induced therein by the movements of the magnetic flux relative thereto; and means for adjusting the position of the coil relative to the magnetic field.

Signed at Highland Park, Ill., this 6th day of May, 1929.

PERCY A. ROBBINS.