Nov. 1, 1960 M. J. SHNITZLER 2,958,791

ALTERNATING CURRENT MOTOR

Filed June 12, 1957

Fig. 1.

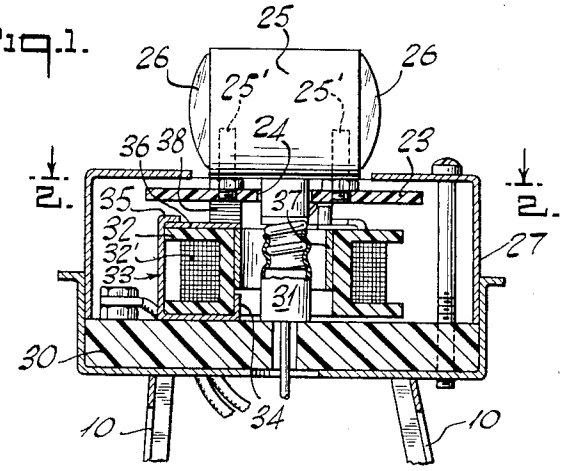


Fig. 2.

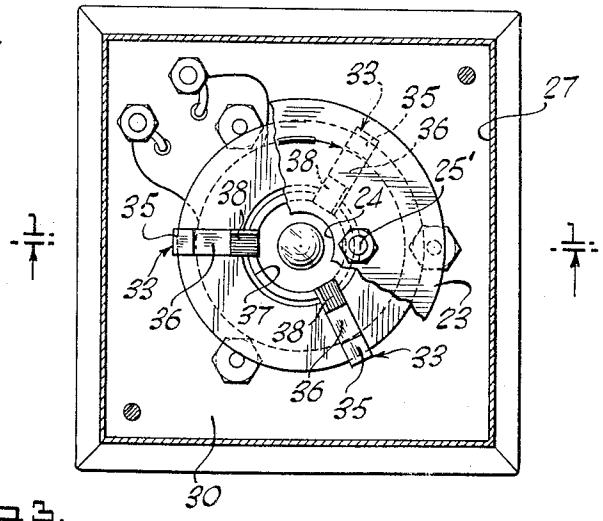


Fig. 3.

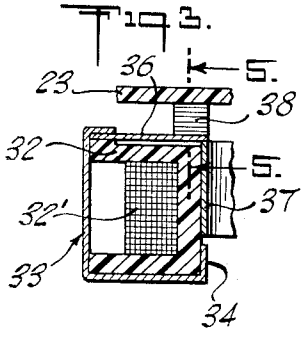


Fig. 4.

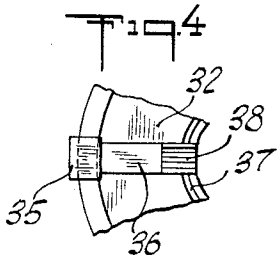
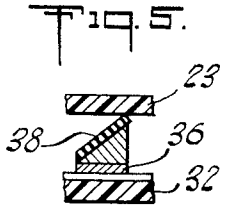


Fig. 5.



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ALTERNATING CURRENT MOTOR

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6 Claims. (Cl. 310—23)

The present invention relates to vibratory apparatus for effecting rotary motion and is more particularly directed toward electrically operated apparatus responsive to alternating current for effecting rotation of a suitable element.

In various devices such as display apparatus and the like, it is desirable to revolve a rotary element, such as a light controlling structure about a fixed lamp so that light beam or beams may be turned by remote control about a vertical axis to either direct the beam in a predetermined direction after the fashion of a swingable searchlight, or revolve them about in the fashion of a revolving beacon.

A principal object of the invention is to provide a simple, reliable, inexpensive motor utilizing an alternating current relay having a reciprocating armature which causes a rotary element supported solely by resilient finger means to coact therewith so as to continuously rotate said rotary element.

Other objects and advantages of the invention will be apparent from the following description and the drawing, in which:

Figure 1 is a sectional view of a toy beacon on the line 1—1 of Figure 2, parts being broken away;

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1;

Figure 3 is a fragmentary enlarged sectional view also on the line 1—1 of Figure 2;

Figure 4 is a fragmentary top plan view of the structure illustrated in Figure 3; and

Figure 5 is a fragmentary vertical sectional view on the line 5—5 of Figure 3.

Referring to the drawing, the upper portions of the side members of a toy tower suitable for use with toy railroads are illustrated at **10**. They support a plate **30** on which is mounted the lamp socket **31** and a coil form or spool **32** concentric about the lamp socket, and supporting a coil **32'**. This spool is provided with a nearly closed magnetic circuit which comprises three magnetizable straps **33** whose inner ends **34** are inside the coil and whose outer upper ends **35** are bent over onto the spool. Secured under the ends **35** are steel springs **36** which are spaced from the spool, except at their outer ends and hence are free to vibrate. The springs **36** carry an armature in the form of a tube **37** extending close to the ends **34** of the straps **33** to provide a gap therebetween. These springs carry oblique yieldable fingers **38** with oblique yieldable tips made of rubber or rubber like material. These yieldable tips support a plate or disk **23** having a central opening **24** through which the lamp extends. This plate removably supports by means of pins or rods **25'** a revolvable lamp housing **25** which is here shown as having a horizontal cylindrical opaque beacon body and two oppositely directed lens-like members **26, 26**. The plate **23** and beacon body are held against accidental removal by a cover member **27**.

When the device is energized with alternating current the armature vibrates vertically and the engagement of

the yieldable tips **38** with the under surface of the plate **23** causes this plate and the beacon mechanism carried by it to revolve so long as current is applied. It will be noted that in the above constructions, the energization of the electromagnetic apparatus by alternating current produces armature vibration and the cyclical deformation of the fingers **38** resulting from the alternate attraction and release is effective to impart unidirectional force to the rotor plate **23** to rotate the same.

This application is a continuation-in-part of my application Serial No. 303,542, filed August 9, 1952, and now abandoned.

What I claim is:

1. A vibratory apparatus for effecting rotary motion, said apparatus comprising a non-rotary element and a rotary element, one of said elements having a flat annular surface, the other of said elements having a resilient finger means for engaging said surface at a plurality of points and constituting the sole support of said rotary element in the direction at right angles to the plane of said surface, said non-rotary element comprising a cylindrical coil, the axis of said coil being at right angles to the plane of said annular surface and passing through the center thereof, magnetizable members constituting a substantially closed magnetic path about said coil and comprising an armature free to reciprocate in the direction of the axis of the coil in response to the energization of said coil, means for fastening the armature to the non-rotary element to prevent rotation, means whereby the reciprocation of said armature serves alternatingly to compress said resilient finger means against said annular surface and relieve the same from such pressure, said finger means being tilted with reference to said axis so as to cause relative rotary motion between the element having said finger means and the element having said annular surface, when said armature is reciprocated.

2. The apparatus of claim 1 in which the said armature comprises a cylindrical portion concentric with said cylindrical coil.

3. The apparatus of claim 1 in which the said resilient finger means comprises a plurality of fingers for engaging said annular surface at equally angularly spaced points thereof.

4. The apparatus of claim 1 having means for maintaining the rotary element centered about the axis of the coil and free to move toward and from the coil along the axis thereof.

5. A vibratory apparatus for effecting rotary motion, said apparatus comprising a non-rotary element and a rotary element, one of said elements having a flat annular surface, compressible resilient finger means for engaging said surface and serving to support said rotary element in the direction at right angles to the plane of said surface, said non-rotary element comprising a cylindrical coil, the axis of said coil being at right angles to the plane of said annular surface and passing through the center thereof, one of said elements comprising an armature free to reciprocate in the direction of the axis of the coil in response to the energization and deenergization of said coil, non-rotary magnetizable members constituting with said armature a magnetic path about said coil which is substantially closed except for an air gap, means whereby the reciprocation of said armature serves alternatingly to compress said resilient finger means against said annular surface and relieve the same from such pressure, said finger means being tilted with reference to said axis so as to cause relative rotary motion between the element having said finger means and the element having said annular surface, when said armature is reciprocated, said rotary element having an axial opening and means including an axial non-rotary member extending

through said opening for maintaining the rotary element centered about the axis of the coil by preventing lateral movement of the rotary element.

6. A vibratory apparatus for effecting rotary motion, said apparatus comprising a frame, a non-rotary element and a rotary element, said rotary element being a disc having a flat surface, said disc having a central opening, a cylindrical member fixed to said frame and extending through said opening for preventing lateral movement of said disc, said non-rotary element having resilient finger means for engaging said surface at a plurality of points thereon and constituting the sole support of said disc in the direction at right angles to said surface, said non-rotary element comprising a cylindrical coil, the axis of said coil being coaxial with said disc, magnetizable members constituting a magnetic path about said coil which is closed except for a gap and comprising an armature free to reciprocate in the direction of the axis of the coil

in response to the energization and deenergization of said coil, means resiliently mounting said armature on said coil and connecting said armature to said resilient finger means whereby the reciprocation of said armature serves alternatingly to compress said resilient finger means against said flat surface of the disc and relieve the same from such pressure, said finger means being tilted with reference to said axis so as to cause relative rotary motion of the disc when said armature is reciprocated.

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