Dec. 15, 1931. J. D. CARLEY 1,836,748

MECHANISM

Filed Sept. 14, 1929 2 Sheets-Sheet 1

FIG:1

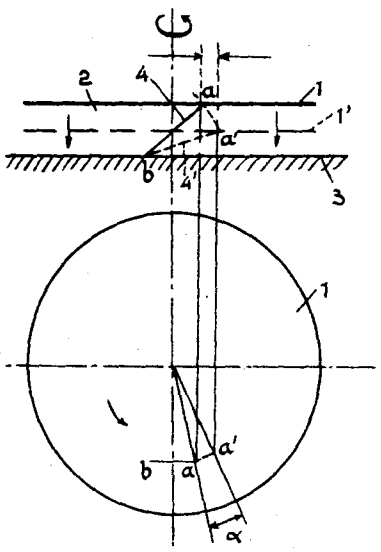


FIG:2

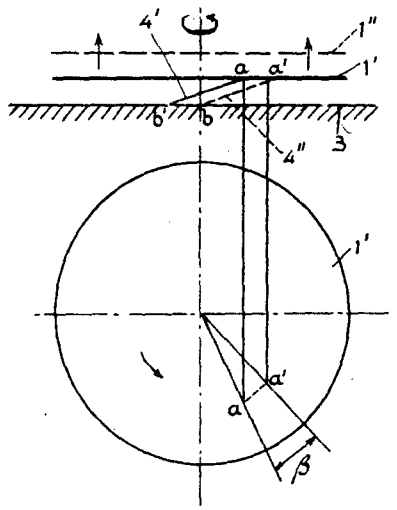


FIG:3

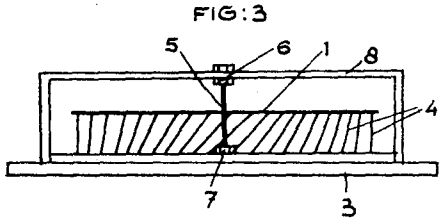


FIG:4

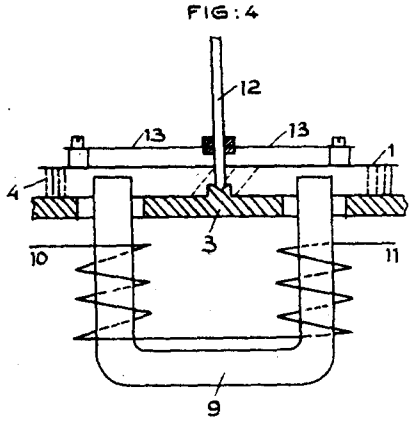
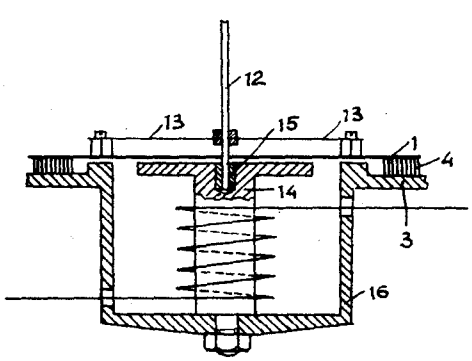


FIG:5



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MECHANISM

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FIG:6

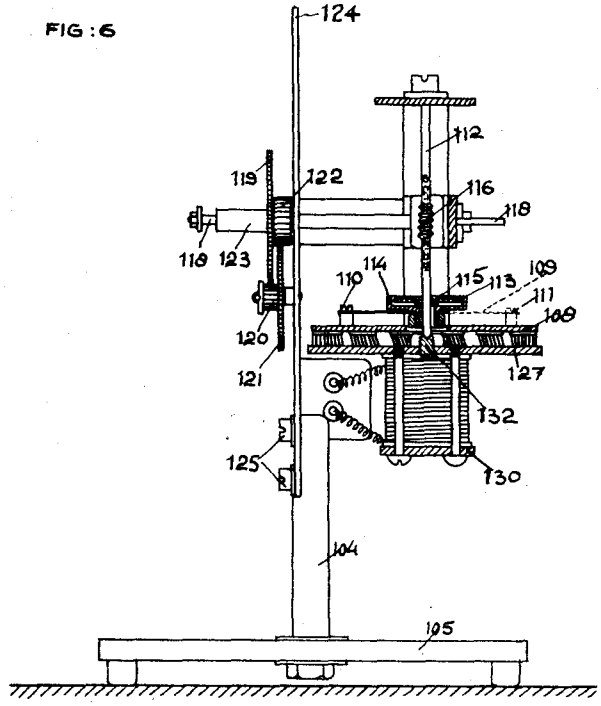
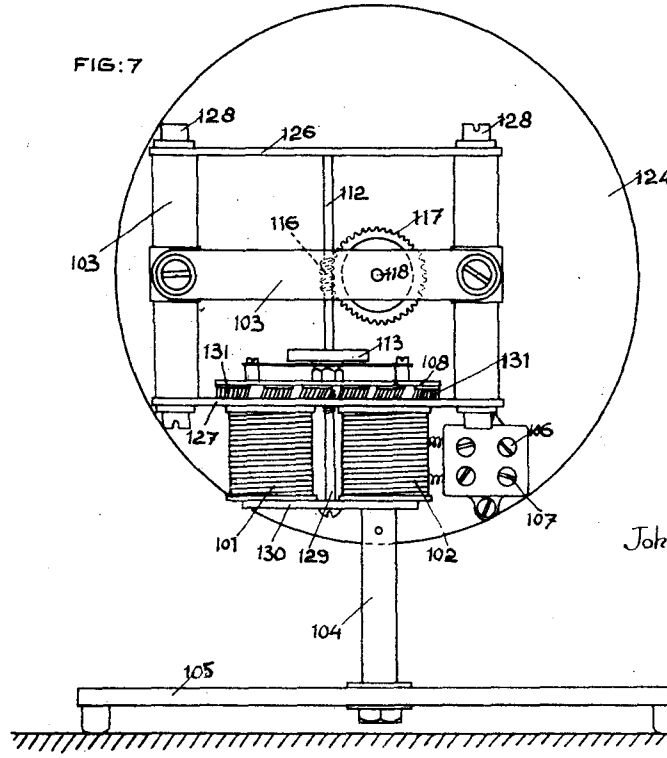


FIG:7



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UNITED STATES PATENT OFFICE

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MECHANISM

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The invention relates to a mechanism that may be employed for the conversion of oscillations, for example electric, mechanical or acoustic oscillations, into a rotary or reciprocatory motion. The mechanism can be employed for the drive of clocks, for the motion of advertising apparatus or for other purposes.

The mechanism according to the invention is characterized in that the motion is called into existence by the alternating increase and decrease of the reciprocal distance between two bodies, and by the influence of oscillations or impulses, which are communicated to one of the bodies or to both. Hereby these bodies are held apart from one another by the resilient organs, or by a resilient substance, which possess the properties during this alternating increase and decrease of the reciprocal distance of the bodies effecting a relative motion of these bodies parallel to their surface of contact.

The intermediate layer between the two bodies can for example be formed by a plush-like textile material with pile-wires or by a brush surface or the like formed for example by raised metal threads.

For the production of a rotary motion of one of the above mentioned bodies or of both in accordance with the invention, the resilient organs (pile wires or brush wires) of the intermediate layer may be so disposed, that as a result of the oscillations the bodies produce a relative rotation.

According to the invention the movable bodies can be constructed of a plurality of parts and these single parts can correspond to different numbers of oscillations, whilst the organs of the intermediate layers are so disposed, that in changing application to different numbers of oscillations (frequency) both parts produce a to and fro relative motion.

The invention is illustrated in the drawings by way of examples of construction.

In Figs. 1 and 2 the basic idea, to which the invention relates, is shown diagrammatically.

Fig. 3 shows diagrammatically an apparatus for the employment of sound waves for the production of a rotary motion or for the registration of acoustic oscillations, which then may set in rotation a circular plate.

Fig. 4 shows diagrammatically an apparatus for inclusion in an alternating current circuit, in which electric oscillations by means of an electromagnet act on a membrane or plate which as a result rotates on its axis.

Fig. 5 shows a modified form of the apparatus according to Figure 4.

Fig. 6 shows the side view of the mechanism according to the invention as applied to the drive of a clock.

Fig. 7 is a rear view of the same mechanism appertaining to Figure 6.

In Figure 1 a membrane designated 1, rests on a supporting surface 3 by means of an intermediate layer of alterable thickness.

The intermediate layer can be secured to the supporting surface 3 instead of to the membrane 1 or can rest thereon.

The membrane 1 is rotatable about a vertical axis. The intermediate layer is formed of a resilient material or a resilient organ, in both cases of such a kind that in the consecutive decrease or increase of the reciprocal distance between the parts 1 and 3 a motion of these parts relative to one another but parallel to the surface of a contact is produced. For the intermediate layer suitably a material such as plush (mock-velvet) can be employed, which is provided with pile-wires, which are directed at a slope with regard to the surface of the textile material. In order to make clear the operation only a single brush wire or pile wire 4 is shown in Figures 1 and 2.

The membrane first occupies a position 1 (Fig. 1). On arrival at the membrane oscillations or forces now operate so that the distance between membrane 1 and the supporting surface 3 is alternately increased and decreased. The lower end position is designated by 1′ and in Figure 2 in a full line.

By the transfer of the membrane from position 1 to position 1′ firstly the pile wire 4 (Fig. 1) is rotated about its lower end b with which it makes contact with the surface 3, and changes from the position $b\ a$ to the position $b\ a'$, which is shown

in full line in Fig. 2 and in Fig. 1 in dotted line. Hereby its results as appears from the horizontal projection in Fig. 1 that the membrane is rotated through an angle α. It returns, however, into the upper position 1, 1'' (Fig. 2); as a result of the uninterrupted impulses operating on the membrane this play is repeated. As a result the membrane, as has been shown is set in rotary movement so that under the influence of this rotation it has produced a rotation of an angle α and β about its axis, after it has returned to the starting position shown in Fig. 1.

In Figure 3 an apparatus is illustrated which serves for making sound oscillations usable for the production of a rotary motion or to indicate sound waves.

Here a circular membrane 1 is rotatably disposed about a vertical axis 5, which is so disposed in sockets 6, 7, of a bent member 8 and the supporting surface 3, so that a certain play of the axis is possible in the axial direction. The circular member 1 rests on the base surface 3 by means of an intermediate layer, which is provided with raised small pile wires 4. The pile wires 4 are raised somewhat sloping and tangential around the circumference of the circular plate-shaped member 1, so that the plate 1, by the operation of the sound waves intercepted on it can be put in rotation. The apparatus can be employed for measuring the strength of sound oscillations or of sound volume. It can also serve for the indication of sound waves, furthermore for sound waves of a certain number of oscillations to which in this case the membrane 1 must be tuned.

Fig. 4 shows diagrammatically an apparatus in which an alternating current is applied. An electromagnet 9 is connected to an alternating current circuit by the ends 10 and 11 of the winding of the magnet. The bipolar magnet acts on a membrane 1 which is rotatable about a shaft 12. The membrane 1 is attached to the shaft 12 by means of a leaf spring 13, of which the outer ends are secured to the membrane 1 and the inner ends are secured to the shaft 12. The connection is so formed, that the membrane 1 can perform oscillations perpendicular to its own plane independently of the axis 12. The membrane 1 is supported by the intermediate layer 4 in a resilient manner on the supporting surface 3, which in the manner above described can be formed of a textile material or of a material with pile wires (illustrated in Figure 4 only partly and with dotted lines) raised in a direction round the circumference of the membrane.

The membrane 1 consists of a magnetizable material, so that the flow of magnetic force to the magnet is closed by the membrane. If the electromagnet be connected now to a source of alternating current the membrane 1 as a result is put in oscillation, so that it produces in the manner above described at the same time a rotation about its axis 12.

The form of construction according to Figure 5 differs from that according to Figure 4 only so far that in this case a unipolar magnet 14 is employed which forms at the same time the lower socket 15 for the shaft 12. The membrane 1 is in like manner as in Figure 4 secured to the axis 12 by means of the spring 13 and is supported on the supporting surface 3 by means of the intermediate layer formed by the pile wires or brush, which in this case are formed on a ring shaped flange which is constructed on the housing 16 of the electromagnet 14.

The mechanism according to the invention is suitable for a series of purposes in which oscillations are to be converted into a uniform rotary or uniform rectilinear motion. Thus the apparatus can be employed suitably as mechanism for clocks, electric power, movable advertising devices, as a registering device both for demonstration and instructional purposes, for mechanical toys and the like.

Constructed for a rotary motion the movable part can also execute a rectilinear motion with regard to the supporting surface in which case the pile wires of the intermediate layer are raised in a single direction. The movable part can also be formed in two or more parts and each of these parts correspond to another number of oscillations, wherein the pile wires are so disposed, that by changing application to different numbers or oscillations the two parts execute a rectilinear motion relative to each other. Furthermore the apparatus can be so constructed, that indeed according to the number of oscillations the movable part is moved in a certain direction or in an opposed direction to the fixed part.

In the construction according to Figures 6 and 7 the magnetic system which consists of two windings 101 and 102 connected one behind the other or side by side, secured to a frame 103, which is secured to a footplate 105 by means of a standard 104. The magnetic system 101, 102, is fed with alternating current and can for example be included by means of the closure clamps 106 and 107 in an alternating circuit suitably the usual lighting distribution system. The magnetic system acts on an armature 108, which has the form of a flat circular plate. This armature 108, is secured by means of a leaf-spring 109 and screws 110 and 111 to a vertical shaft 112 and suitably by connection to a resilient coupling 113. The shaft 112 is disposed in two plates 126 and 127, which form a part of the frame 103 and are connected therewith by screws 128. The lower plate 127 is connected by means of screws 129 with a plate 130, which is disposed under the magnetic winding 101 and 102.

The magnet-armature 108 is formed of circular shape and on the lower side is provided with small brushes or strips of plush 131, which are so disposed, that as a result of the vertical oscillations which the armature 108 receives under the influence of the magnet windings 101 and 102, this armature 108 undergoes a rotation about the vertical axis 112 with which it is coupled. As a result of this the worm wheel 117 is set in rotation by the worm 116, which rotation is transmitted to the axle 118 and by the gear wheel system 119/122 to the hub 123.

The coupling 113 consists of a drum 114, which is connected with the leaf-spring 109 and a spiral spring 115, which is coupled by its inner end with the shaft 112 about the outer circumference of which the inner wall of the drum 114 slips. Normally the motion of the rotating armature 108 is transmitted to the shaft 112. However, should the resistance be too great the spring 115 slips with relation to the inner wall, of the drum. The shaft 112 is provided with a worm 116, which is in engagement with a worm wheel 117 secured to the shaft 118, which in the usual manner carries the minute hand (not shown in the drawings). The gear wheels 119, 120, 121 and 122, serve to drive the hub 123, which is mounted on the shaft 118 and carries the hour hand illustrated. The dial is indicated at 124. It is secured to the standard 104 by means of screws 125.

A regulating screw is indicated at 132, which is screwed into the upper plate 127 of the magnetic system, and which is constructed as a lower bearing for the shaft 112.

If the magnetic system 101, 102 is submitted to the action of a current by connection to an alternating current circuit, the circular armature 101 is set in oscillation by the influence of the attraction by the magnets 101, 102, on the one hand and the influence of the spring 109 on the other hand. Thereby the plush strips or brushes 131 are alternately pressed together and again given freedom. During the pressing together, that is to say if the armature is attracted this has as a result a rotation of the plate 108 about the shaft 112. In the unit of time the plate 108 thus receives a great number of impulses, in the same sense of rotation so that it is rotated with a uniform velocity and thereby drives the shaft 118 by means of the worm transmission gear.

What I claim is:—

1. A mechanism for transforming oscillations into a rotary movement comprising a resilient member being of the nature of pieces of pile fabric or brushes and having groups of bristles or fibres projecting therefrom, an axially oscillating serrated disc adapted for rotary movement, and a fixed plate parallel to said disc and on which the pieces of pile fabric or brushes are secured for contact of the bristles with the serrated surface of the movable disc, the bristles having a predetermined inclination with respect to the plane of the disc, whereby a rotary movement is imparted to said disc as the disc approaches the fixed plate.

2. An electromagnetic driving mechanism, comprising a rotatable magnetizable disc armature operating in an alternating magnetic field and oscillating axially under the action of the said field, in combination with resilient members secured to said disc, said resilient members being of the nature of pieces of pile fabric or brushes, the fibres or bristles thereof being inclined to the surface of said disc and disposed to contact at their free ends with said surface, whereby a rotary movement is imparted to the latter as the distance between the disc and the said fixed surface is alternately increasing and decreasing.

3. A mechanism for transforming oscillations in a rotary movement, comprising a pair of parallel discs, one thereof being adapted for axial oscillations with respect to the other disc, and a resilient member of the nature of pieces of pile fabric or brushes carried by one of the discs and composed of groups of bristles or fibres projecting therefrom, each group having a predetermined inclination with respect to the planes of said discs and engaging at the free ends of the bristles with the surface of one disc, whereby axial oscillations of the one disc cause the bristles to impart rotary movement to one of the discs.

In testimony whereof I affix my signature.

JOHAN DIRK CARLEY.