CONICAL PENDULUM, ALTERNATING CURRENT CLOCK

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Fig. 1.

Fig. 2.

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1 Claim. (Cl. 59—30)

The present invention relates to an alternating current electric clock utilizing a conical pendulum, i. e., a pendulum swinging in a conical path.

It is an object of the invention to provide a clockwork that is extremely simple in its construction, silent in operation, and highly accurate. In accordance with the invention, the running of the clock is controlled by the frequency of the pendulum which is formed of electrically conductive material and is caused to swing in a conical path by means of a rotating or oscillating electric field, as in an induction motor. The electric field for moving the pendulum is provided by means of polyphase current obtained either from a suitable polyphase source or by a suitable phase splitting device. The clockwork is driven directly from the pendulum, there being no escapement as in conventional pendulum clocks. As the timing of the clock is determined by the frequency of the pendulum, high accuracy is maintained.

Other objects, advantages and characteristic features of the invention will become apparent as the description hereafter proceeds with reference to the accompanying drawings forming part of the specification and illustrating diagrammatically by way of example a preferred embodiment. In the drawings:

Fig. 1 shows in elevation a clock without escapement actuated by a device constituting another form of embodiment of the invention.

Figs. 2 illustrates in plane view the source of the shaft 48.

Movement of the pendulum is maintained by an induction member consisting of eight horizontal cores 51 to 58 formed with suitable windings and disposed radially about the vertical axis of shaft 48.

The windings of these cores are divided into two groups of four. The winding of cores 51, 53, 55 and 57 are connected in series with one another, the series being connected directly across an alternating current source. The winding of cores 52, 54, 56 and 58 are likewise connected in series with one another, the series being connected to the alternating current source through a dephasing means 60, so that the phase displacement between the two series of windings is about one-quarter cycle. The assembly of the monophase A. C. source 59 and of the dephasing means 60 form a source of di-

phased A. C. current. As a result, these cores create A. C. fields differing in phase in eight respective zones situated at the periphery of the star formed by the eight induction members and which are distributed at spaced intervals along the circular path 61 which is that followed by the mass 43 during the free oscillation of the spherical pendulum constituted by the induced member.

A light horizontal arm 62 is rotatably mounted about a pivot 63 positioned in alignment with the shaft 48.

This horizontal arm is formed with an oblong aperture 64 through which the rod 44 extends freely. When the energizing circuits are disconnected and the pendulum is inoperative, rod 44 bears on the inner end 66 of aperture 64 and the mass 43 is thus held in the vicinity of its operative path 61.

When these cores are energized, the mass 43 will start rotating at a low speed whilst driving the light arm 62, then after some time of rotation gradually increases until its value is close to that corresponding to the rated speed of oscillation of the pendulum on its path 61. Then the rod 44 leaves the inner end 66 of the oblong aperture 64 and subsequently bears only slightly on one side edge of this aperture.

During its conical motion the rod 44 drives the shaft 48 through the medium of the pivot connection or joint 47. The shaft 48 is coupled through toothed wheels and pinions 60 to the hands 69 of a dial 71 also mounted on the bridge members 43.

The clock thus obtained is extremely accurate and silent in operation and has no escapement. If it is desired to increase its precision any known electrical device may be inserted in the supply line in order to attenuate or dissipate any surge effect or irregularity in the voltage and frequency of the mains supply.

In the example illustrated the induction member is shown as consisting of eight coils because this number is practical for two-phase supply. However, the same results could be obtained as well with six or twelve coils fed with three-phase current. In the case herein shown and described the shaft 48 may be used for actuating any chronograph or chronometer system other than a clock, for example a recording cylinder.

What I claim is:

An electric clock comprising a frame structure, a vertical shaft mounted for rotation in the upper portion of said frame structure, a rod pivotally connected to said vertical shaft and depending towards the lower portion of said frame structure, a metal mass fixed at the lower end of said rod, a plurality of coils disposed circumferentially at the lower portion of said frame structure beneath said rod and said metal mass, a light arm rotatably mounted on said frame structure about a vertical pivot pin and surrounding said rod with clearance, adapted to maintain said rod in an oblique position when it tends to be positioned vertically so that said mass will be held within reach of said coils, a source of polyphase alternating current the successive phases of which are connected to successive coils, a dial and hands at the upper portion of said frame structure, and a driving connection between said vertical shaft and said hands of said dial.

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