No. 868,572. PATENTED OCT. 15, 1907.

C. E. LORD.

SHAFT OSCILLATOR.

APPLICATION FILED JAN. 25, 1905. RENEWED DEC. 17, 1906.

Fig. 1.

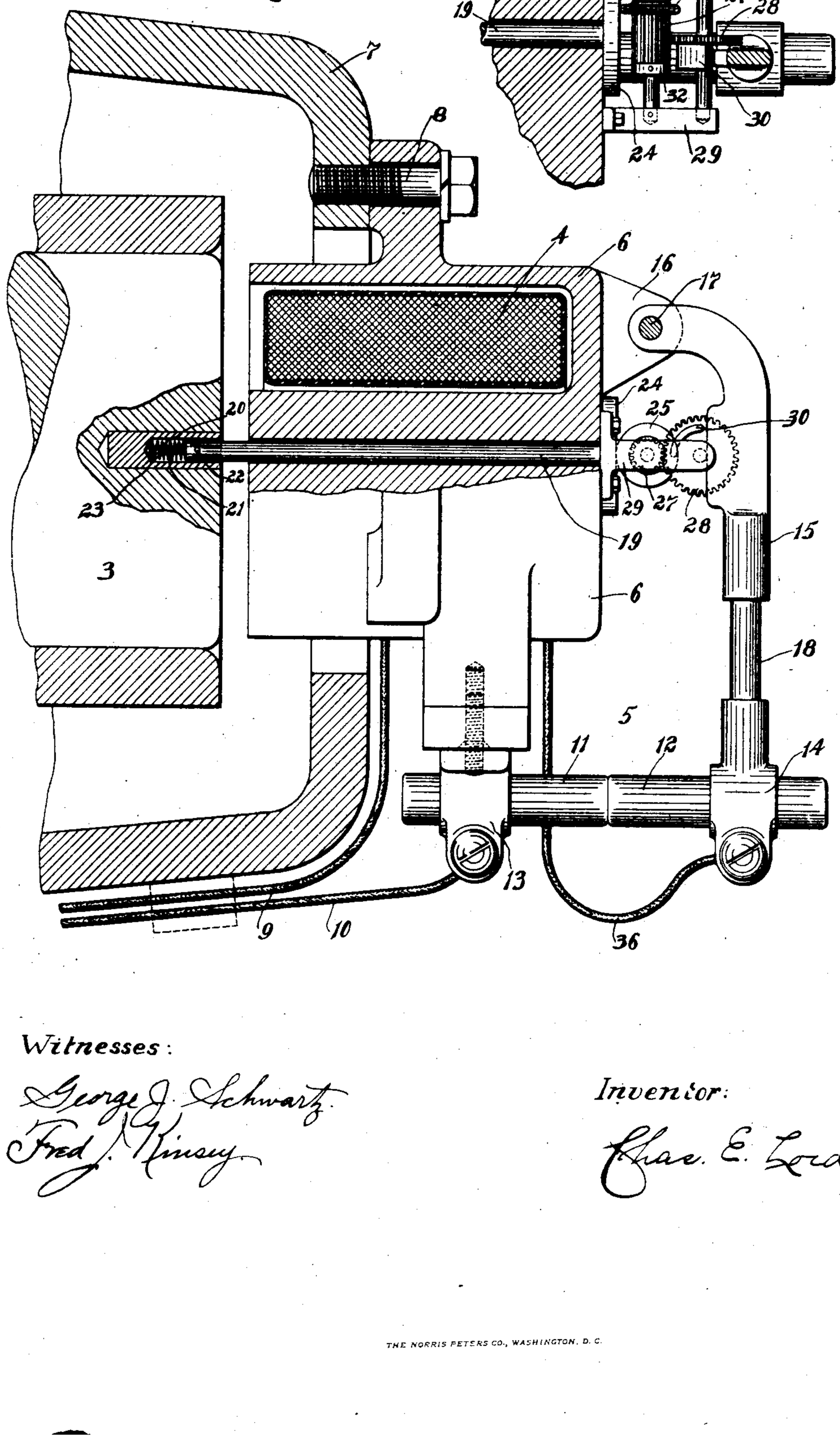

Fig. 2.

Witnesses:

George J. Schwartz.

Fred. J. Kinsey.

Inventor:

Chas. E. Lord

UNITED STATES PATENT OFFICE.

CHARLES E. LORD, OF NORWOOD, OHIO, ASSIGNOR TO THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

SHAFT-OSCILLATOR.

No. 868,572. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed January 25, 1905, Serial No. 242,698. Renewed December 17, 1906. Serial No. 348,253.

To all whom it may concern:

Be it known that I, CHARLES E. LORD, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Shaft-Oscillators, of which the following is a full, clear, and exact specification.

My present invention relates to means for oscillating shafts longitudinally in their bearings.

The invention is particularly applicable as a means for giving an end-play to the rotating members of rotary converters or other dynamo electric machines in which such a movement of the shaft is for any reason found desirable.

The object of my invention is to produce a simplified form of electro-magnetic shaft oscillator which may be readily adjusted to vary the period of oscillation of the shaft without changing the speed of rotation thereof.

In accordance with my invention I make use of a magnetizing coil mounted in inductive relation to the end of a shaft and employ a switch to open and close the circuit through said coil, said switch being operated by mechanism which is so constructed and arranged that it may be adjusted at will to produce any desired rate of oscillation of the shaft.

The invention will be better understood by reference to the following description taken in connection with the accompanying drawings, and the scope of the invention will be particularly pointed out in the appended claims.

In the accompanying drawings Figure 1 illustrates a side elevation partly in section of my improved shaft oscillator as applied to the end of the shaft to be oscillated; and Fig. 2 is a plan view partly in section of the adjustable switch-operating mechanism.

In the figures of the drawing, the oscillator is illustrated as mounted in inductive relation to the shaft 3, and consists of a magnetizing coil 4, having the controlling switch 5 connected in circuit therewith. The coil 4 is mounted within the casing 6 of magnetizable material, fastened to the bearing housing 7 by means of the bolts 8. The coil 4 is connected to a source of supply of energy through the leads 9 and 10 and is alternately energized and deënergized by being connected to and disconnected from said source of energy supply by means of the switch 5. This switch consists of two contact members 11 and 12 preferably of carbon, the contact member 11 being adjustably mounted in the clamp 13 fastened to the casing 6 and depending therefrom. This contact member 11 when properly adjusted retains a fixed position relative to the casing 6. The contact member 12 is adjustably mounted in the clamp 14 carried by the lower end of a lever arm 15 pivoted at 17 to a lug 16 formed on the casing 6. The clamp 14 is insulated from the upper end of lever 15 by means of the block 18 of insulating material. The switch 5 is normally closed, the contact member 12 being maintained in engagement with the contact member 11 by gravity, which may be assisted by a light spring if so desired.

The means for intermittently opening the switch 5 to deënergize the coil 4 will now be described. Loosely mounted in a longitudinal opening in the casing 6 is a spindle 19 engaging at its inner end telescopically with the shaft 3. The shaft 3 is recessed at 20 to receive the end of the spindle 19 and this recess 20 is provided with a slot or key-way 21 with which the pin 22 projecting laterally from the spindle 19 is adapted to engage. A spring 23 is also mounted in this recess 20 and bears against the inner end of the spindle 19. The function of this spring will be explained later. By means of this telescopic connection the shaft 3 is capable of a reciprocatory movement relative to the spindle 19, while at the same time said spindle is constrained to rotate at a speed equal to that of the shaft. Mounted upon the outer end of said spindle 19 and rotating therewith at the speed of the shaft is a circular plate 24. A circular disk 25 rotatably mounted on the relatively fixed spindle 26 has its periphery bearing against said plate at a point out of alinement with the axis of rotation thereof. The spring 23 in recess 20 maintains the plate 24 and disk 25 in firm contact with each other irrespective of the position of shaft 3. Attached to disk 25 and rotatably mounted on spindle 26 is a pinion 27 which rotates with the disk 25 and has meshing therewith the gear wheel 28 mounted in the frame 29, rigidly fastened to the casing 6. The gear wheel 28 carries a cam 30 which engages the lever 15 to open switch 5 once in every rotation of the gear wheel 28. As the speed of rotation of the gear wheel 28, and hence the time interval between the successive openings of the switch 5 depends upon the speed of shaft 3, and also upon the position of the disk 25 on the plate 24, it will be seen that for any definite speed of rotation of the shaft 3 any desired rate of oscillation of said shaft may be obtained by merely changing the position of said disk 25 radially relative to the axis of plate 24. For the purpose of thus adjusting said disk 25, I mount the disk and pinion 27 loosely on spindle 26 and employ collars 31 and 32 to hold them in any desired position upon said spindle. The spindle 26 is so arranged that a movement of the disk 25 longitudinally thereon will change the point of contact of the periphery of said disk upon said plate in a radial line relative to the axis of rotation of said plate.

With the shaft oscillator in the position illustrated in Fig. 1 and the leads 9 and 10 connected to a source of energy supply the coil 4 is energized by current flowing through the following circuit; lead 9, coil 4, thence through lead 36 and contact members 12 and 11 of switch 5, returning to the source of supply through lead

10. The magnetic shaft oscillator thus energized attracts the rotating shaft 3, moving same against its normal bias. In a dynamo electric machine this normal bias is produced by the magnetic field in which the armature of the machine rotates. The continued rotation of said shaft 3 causes the gear wheel 28 to rotate until the cam 30 strikes the lever arm 15 and opens switch 5 thus deënergizing coil 4. The shaft 3 thus released from the attractive force of the coil 4 returns to its normal position. In the meantime a continued rotary movement of the gear wheel 28 permits the switch 5 to be closed again preferably by gravity, and the circuit through the coil 4 is again completed, causing the shaft to be attracted again toward said magnetizing coil. Any desired rate of oscillation may be produced, but the device is preferably adjusted to produce the so-called natural period of oscillation of the shaft.

Many modifications and changes may be made in the specific embodiment of my invention herein illustrated and described without departing from the spirit of the invention, and I aim in the appended claims to cover all such changes and modifications.

Having thus described my invention, what I desire to claim as new and to secure by Letters Patent is:—

1. The combination of a shaft, a magnetically actuated shaft oscillator, means operated by said shaft for energizing and deënergizing said oscillator, and means for adjusting said means to vary the period of oscillation of said shaft.

2. The combination of a shaft, a coil in inductive relation to the end of said shaft, a source of electric energy, means for intermittently connecting said coil to said source of energy, and adjustable means driven by said shaft for operating said connecting means at any desired rate without changing the speed of rotation of the shaft.

3. The combination of a shaft, a coil in inductive relation to the end of said shaft, a switch in circuit with said coil, means driven from said shaft for intermittently operating said switch to open the circuit through said coil, and means for varying the time interval between the successive openings of said switch without changing the speed of rotation of the shaft.

4. The combination of a shaft, a coil in inductive relation to the end of said shaft, a switch in circuit with said coil, a plate connected to said shaft and rotating therewith, a disk having its periphery engaging said plate, means controlled by the rotary movement of said disk for intermittently operating said switch to open the circuit through said coil, and means for adjusting the position of said disk upon said plate to vary the time interval between the successive openings of said switch.

5. The combination of a shaft, a coil in inductive relation to the shaft, a switch in circuit with said coil, and means comprising a rotary disk driven by said shaft for opening said switch, the position of said disk being adjustable.

6. The combination of a shaft, a coil in inductive relation to the end of the shaft, a switch in circuit with said coil, means comprising a pair of rotary members driven by said shaft for operating the switch at intervals, the position of one of said members being adjustable laterally of the axis of the shaft.

7. The combination of a shaft, a coil in inductive relation to the end of the shaft, a switch in circuit with said coil, a rotary disk driven by said shaft, a rotary member driven by said disk, said rotary member having means for opening said switch, and means for altering the speed of said rotary member without altering the speed of the shaft.

8. The combination of a shaft having a recess in the end thereof, a coil inductively related to the end of the shaft, a switch in circuit with said coil, a spindle having one end located in the recess and rotating with the shaft, a resilient member in the recess between the spindle and shaft, and means operated by said spindle for opening said switch at intervals.

9. The combination of a rotary shaft capable of an axial movement, a spindle rotating with the shaft and arranged in line with the axis of the shaft, a spring between the spindle and shaft, a disk on the outer free end of the spindle, a coil inductively related with the end of the shaft, a make-and-break device in circuit with the coil, and means driven by the disk for operating the make-and-break device at intervals.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHARLES E. LORD.

Witnesses:
WILLIAM F. BOUCHÉ,
FRED J. KINSEY.