# PATENT SPECIFICATION

156,408

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Complete Accepted: Jan. 13, 1921.

COMPLETE SPECIFICATION.

## Improvements in and relating to Electrically Operated Mechanism Suitable for Driving Clockwork Trains or the like.

I, FRANK HOLDEN, of 16, Boulevard de Vaugirard, Paris, XV^e, Electrical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a modification of the electromagnetic apparatus described and claimed in Patent No. 118,329. In this case I have described apparatus consisting of a permanent magnet having opposing pole pieces between which a coil is arranged to oscillate, an electric circuit being completed through the coil while it is in the magnetic field so that the coil is repelled or expelled from the magnetic field, the return movement being effected by means of a spring which normally tends to hold the coil in a definite position, a circuit completing mechanism consisting of a contact supported from the spindle co-operating with a second contact mounted on a relatively stationary part of the mechanism, the arrangement of the contacts being such that when the contact carried by the spindle is moving in one direction it only engages the second contact for a very short interval of time, but when moving in the other direction it engages it for a considerably longer period.

The object of the present invention is to simplify the construction of such apparatus thereby reducing the cost of manufacture and at the same time rendering the operation more efficient and reliable.

This invention consists in providing a flat coil operating between permanent magnet pole pieces in place of the coil threaded on the limbs of a permanent magnet as in the prior patent, and also in an improved construction of contact device which ensures a good contact while the coil is in the magnetic field and a quick return of the contacts to their normal positions on breaking of the connection.

The accompanying drawings illustrate this invention, Fig. 1 being a perspective view of the machine and Fig. 2 an enlarged detail view of the contact device.

In Fig. 1 plates 1 and 2 are of magnetic material forming permanent magnets and are connected at one end by means of a support 3, also of magnetic material such as soft iron and at the other end by a support 4 of brass or other non-magnetic material. In proximity to the support, 4, secured to the plates 1 and 2 are soft iron pole-pieces 5 and 6 between which a flat circular coil 7 oscillates. Secured to but insulated from the upper plate 1 is a plate 8 of brass or other non-magnetic material. The spindle 9 of the oscillating member is supported in pivot bearings, preferably jewels, secured in the plates 8 and 2. This spindle carries an arm 10 on the end of which the coil 7 is mounted and is also provided with two arms arranged at 120° on either side of arm 10 carrying counter-weights 11. The oscillation of the spindle 9 is controlled by the helical spring 12 secured at one end by means of a clamp to the spindle 9, and at the other end to the plate 1. The spindle carries near its upper end a contact 13 which is preferably provided at its outer end with an engaging surface 14 of silver or other good conducting material. A second contact 15 is secured to a member 16 in such a position that it projects into the path of the contact 13. The member 16

is pivotally mounted at its ends in jewel or other suitable bearings carried by the plates 8 and 1 and is provided with a flattened portion on one side as clearly shown in Fig. 2 against which a leaf spring 17 bears. This spring tends to hold the contact 15 in its zero position and is so arranged that the contacts 13 and 15 engage when the coil 7 enters the magnetic field between the pole pieces 5 and 6 and engagement is maintained by the pressure of the spring until the coil is practically concentric with the pole-pieces at which point the contact is broken and contact 15 is quickly returned to its zero position. During the return movement, owing to the shape of the contact 15, the duration of the engagement between the two contacts is very short as in the arrangement described in my prior patent.

The leaf spring 17 is electrically connected to the plate 8 through its support 18 while the contact 13 is insulated from the spindle 9 and arm 10 but is electrically connected by a conductor 19 to one end of the coil 7 the other end of which is connected to the arm 10. The spring 12 is electrically connected to the arm 10 at one end and to the plate 1 at its upper end so that by connecting a source of current such as a battery between the plates 8 and 1 a circuit will be completed through the coil 7 when the contacts 13 and 15 are in engagement which occurs as described above when the coil is entering the magnetic field. The coil therefore periodically receives an impulse tending to keep the spindle oscillating in the same manner as described in the patent above referred to.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In electro-magnetic apparatus of the type described and claimed in Patent No. 118,329 a contact make and break device comprising a contact carried by the oscillating member adapted to engage with a second contact secured to a pivoted member having a flattened portion against which a leaf spring bears so as to hold the second contact in a definite position and to return it quickly to that position after dis-engagement from the contact carried by the oscillating member.

2. In electro-magnetic apparatus of the type described and claimed in Patent No. 118,329 having a contact make and break device as claimed in Claim 1, the employment of a flat coil oscillating between the poles of the permanent magnet substantially as described.

3. The improved electro-magnetic apparatus of the type described and claimed in Patent No. 118,329 constructed arranged and operating substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 24th day of December, 1919.

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[This Drawing is a full-size reproduction of the Original.]

FIG. 1.

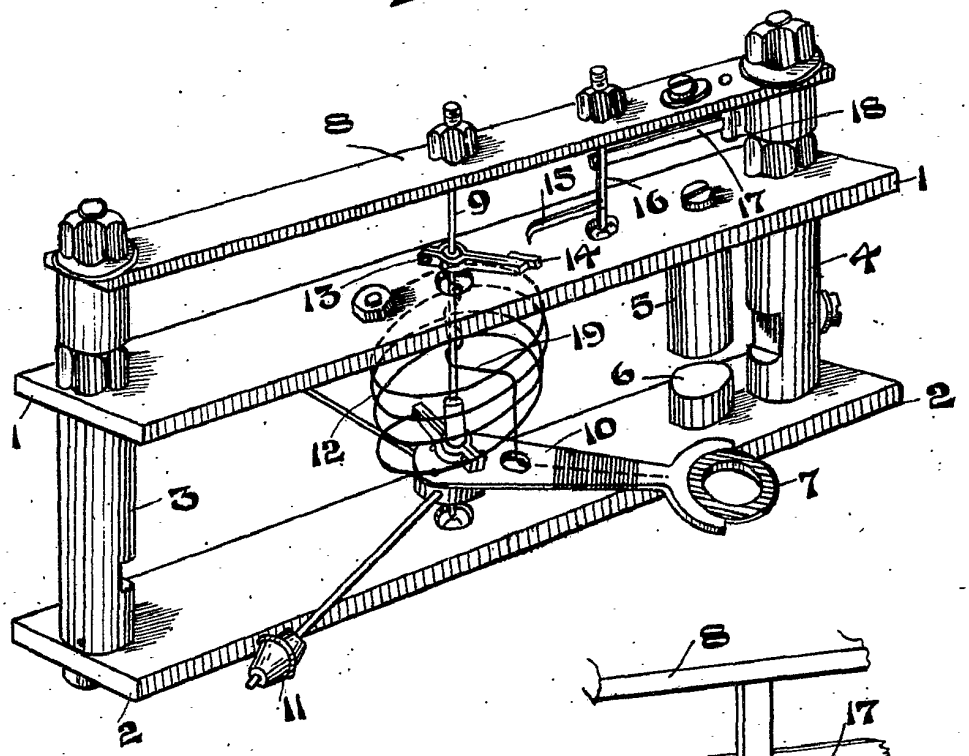
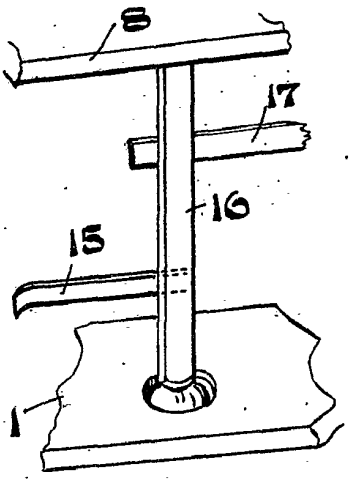



FIG. 2.

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