(No Model.) 2 Sheets—Sheet 1.

F. A. LANE.

ELECTRICAL APPLIANCE FOR WINDING CLOCKS.

No. 415,817. Patented Nov. 26, 1889.

Fig. 1

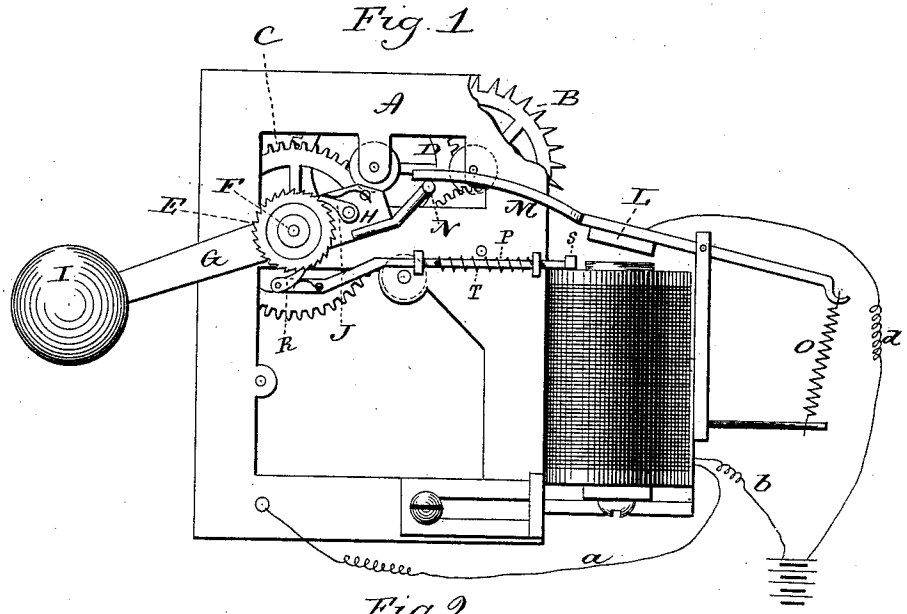


Fig. 2

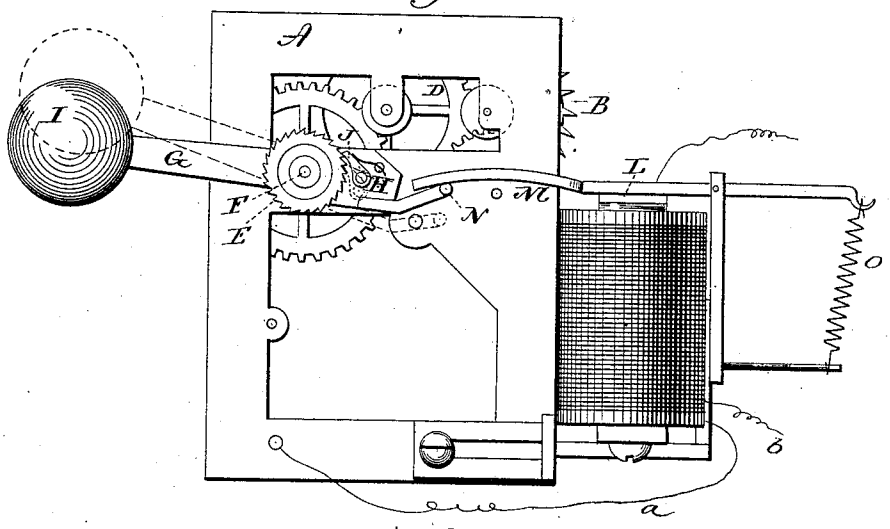
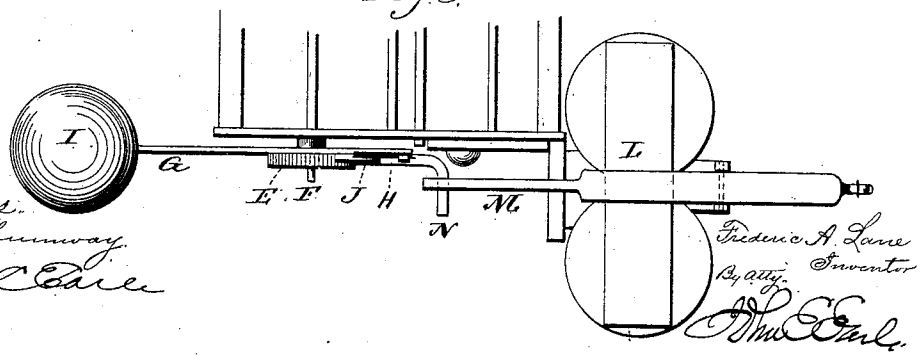


Fig. 3



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4

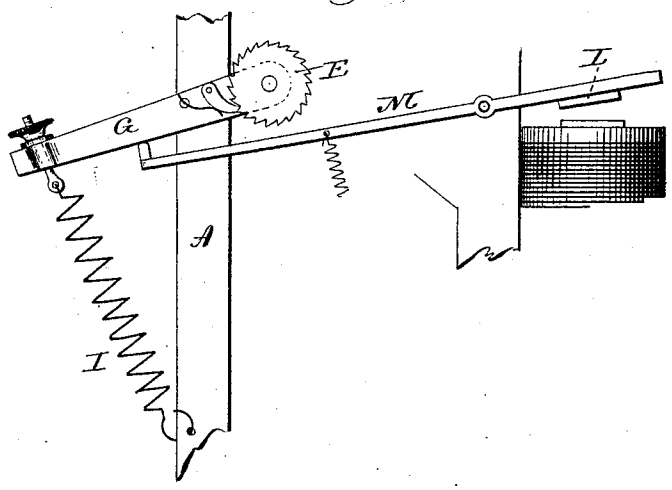
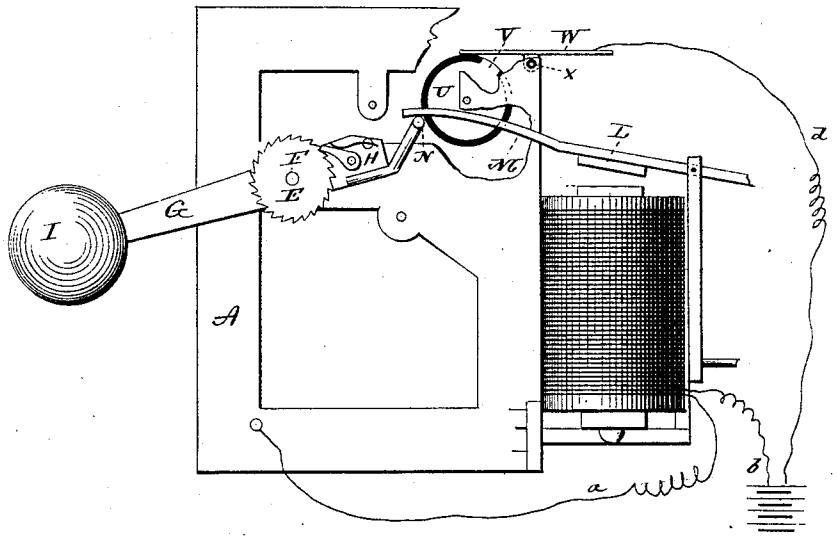


Fig. 5



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UNITED STATES PATENT OFFICE.

FREDERIC A. LANE, OF NEW HAVEN, CONNECTICUT, ASSIGNOR OF ONE-HALF TO FRANK E. MORGAN, OF SAME PLACE.

ELECTRICAL APPLIANCE FOR WINDING CLOCKS.

SPECIFICATION forming part of Letters Patent No. 415,817, dated November 26, 1889.

Application filed March 5, 1889. Serial No. 301,824. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC A. LANE, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Electrical Appliances for Winding Clocks; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a rear view of so much of a movement as is necessary to the illustration of the invention, showing the weight in its down position and just before the circuit is closed; Fig. 2, the same view showing the circuit closed and the weight raised; Fig. 3, a top or plan view of the operating mechanism; Fig. 4, a modification of the same; Fig. 5, a modification.

This invention relates to an improvement in the adaptation of electricity to apply the power to drive clock-work for time or other purposes, the object being a simple device for automatically applying the power to maintain the clock-work in a constant, continuous, or unlimited movement; and the invention consists in the combination of mechanism hereinafter described, and particularly recited in the claims.

In illustrating the invention I show only so much of a clock-work as is necessary to the understanding of the invention.

A represents the rear plate of the frame of the movement; B, the escapement-wheel. In this illustration I show the application of power to the arbor of the wheel C, said wheel C being the second wheel back from the escapement-wheel, D representing the intermediate wheel.

E represents a toothed or ratchet wheel made fast to the arbor F of the wheel C. On the same arbor F a two-armed lever G H is hung so as to swing freely on the said arbor as its center of motion. The arm G carries a weight I, the tendency of which is to depress the arm G. On the arm H is a spring-pawl J, arranged to engage the teeth of the ratchet E in one direction, but so as to escape therefrom in the opposite direction; hence the weight I on the lever G is applied through the pawl J to the ratchet E, with a tendency to rotate that ratchet in a direction to impart the required rotation to the arbor F, the weight I being sufficient to maintain the regular movement of the clock-work. At a convenient point a magnet K is arranged with its armature L hung in the usual manner, so as to make contact with the poles of the magnet. From the armature-lever an arm M extends over the end of the arm H, or a projecting finger N therefrom, as seen in Fig. 1, it only being essential that there shall be a contact-point moving with the arm H, the path of which shall be in the range of the arm M, which projects from the armature. The armature-lever is provided with a spring O, the tendency of which is to raise the armature from the poles when the circuit is broken.

The position of the armature-arm M and the operating-lever G H with relation to each other is such that when the armature-arm is raised the said lever comes in contact therewith only when the weight has reached its lowest position. Now it will be evident that if the armature is drawn down to its poles, as in closing the circuit, the arm H of the lever will be depressed and the weight raised accordingly, and as seen in Fig. 2. In this movement of the lever the pawl J escapes from the teeth of the ratchet, and when the lever has reached its up position re-engages the teeth of the ratchet; so that the power of the weight will be applied through the pawl to the ratchet to rotate the arbor with which the ratchet is engaged.

One wire *a* of the magnet connects with the frame or clock work at any convenient point, the second wire *b* running to the one member of the battery in the usual manner, and another wire *d* runs from the other member of the battery to the armature, also in the usual manner.

The arm M of the armature and the bearing-point for the arm on the lever G H makes metallic contact, so that when the arm M and the said lever are in contact, as seen in Fig. 1, the circuit is closed. Upon the closing of the circuit the armature will be instantly

drawn to its magnet in the usual manner. This movement of the arm M depresses the arm H of the lever, on which the arm M operates, as seen in Fig. 2, until the armature comes to a bearing upon the poles of the magnet. This movement of the arm M is very quick, and imparts to the lever G H with its weight a momentum sufficiently great to cause the lever to turn beyond the point where the arm M comes to a stop, and as indicated in broken lines, Fig. 2. This additional movement derived from the impulse of the armature-arm is caught by the pawl upon the ratchet, as also indicated in broken lines, Fig. 2. This movement of the lever G H beyond the point where the armature-arm stops breaks the contact between the armature and the lever, consequently opens the circuit, and the armature, with its arm M, rises under the action of the spring O to the position seen in Fig. 1. Now the weight I operates upon the ratchet and imparts rotation thereto and thence to the clock-work, and this continues, the weight gradually falling and the arm H correspondingly rising until in due time contact is again made between the armature-arm and the lever, and so as to close the circuit, when the armature is again drawn to its magnet, raises the weight, and breaks the circuit as before. Thus the weight is constantly applied, and so long as the circuit is maintained will do its work in imparting power to drive the clock-work.

In some cases it is desirable to apply a retaining power which will operate while the weight is descending. This may be accomplished in various ways; but as a convenient means for so doing a slide P may be arranged between the ratchet-wheel and the poles of the magnet, supported in suitable bearings and so as to slide toward and from the pole. This slide carries a dog R at one end, adapted to engage the teeth of the ratchet-wheel E, and at its other end is provided with a contact S, which stands in such relation to the pawl that when the circuit is closed the current will tend to draw the slide toward the pole. This tendency occurs while the circuit is closed. The dog of the slide is engaged with a corresponding tooth of the ratchet E, as shown in Fig. 1; hence the power of the magnet, tending to draw the slide toward it, applies that power to the ratchet-wheel, and which power is applied while the weight is ascending, during which time the weight has no power upon the movement. Then when the circuit is broken a spring, as T, serves to draw the slide back to its normal position. This auxiliary device applies a power during the suspension of operations by the weight; hence a continuous power will be applied to the ratchet. This illustration will be sufficient to enable others to apply other and known power-retaining devices to operate during the suspension of the power of the weight should such be desired.

While the invention is specially designed for clock-movements for time purposes, it will be understood that it is applicable to the driving of clock-work for many purposes for which such work is employed. It will also be understood that while the pawl and ratchet constitute a practical device between the lever and the arbor to be driven either of the many known equivalents for pawl and ratchet may be substituted therefor, and by the term "pawl and ratchet" I wish to be understood as embracing such equivalents.

In the arrangement which I have thus far shown and described the armature-arm operates upon the arm of the lever opposite to which the weight is attached; but it will be readily seen that a reverse action of the armature may be employed, as seen in Fig. 4, so that the action of the armature is brought upon the weight-arm G with the same result. The pawl also may be applied on the same arm as the weight, as seen in Fig. 4, so that the lever becomes but a single-arm lever. I however prefer the construction which includes the two-armed lever.

In describing the invention I have made the contacts to open and close the circuit as one arm of the weight-lever comes into contact with the arm projecting from the armature; but the contact may be otherwise made and produce the same result, as represented in Fig. 5, in which a wheel, as U, may be arranged upon one of the arbors of the clock-movement, the periphery of the wheel presenting a non-metallic surface, as hard rubber, except at one or more points, as V, which are metallic.

The arbor of the wheel makes metallic contact with the frame of the clock-movement, to which one wire *a* of the circuit is attached, as before described. A metal finger or brush W is arranged to bear on the periphery of the wheel U, the finger being insulated from the clock-movement by a non-metallic connection, as X, the other wire *d* of the circuit being in connection with the finger W, and so that when in the rotation of the wheel U the metal contact V comes to the finger W metallic contact is made and the circuit closed, when the armature will operate as before, and through its arm impart the swinging movement to the weight-lever necessary to re-engage the arbor upon which the lever is hung. In this case it will be desirable that the circuit should be closed before the weight-lever comes into actual contact with the armature-arm.

Instead of making the circuit through the clock-movement itself, it will be readily seen that it may be made at any point distant from the clock, and by an independent instrumentality—as, for instance, a second clock-work, like that described, may be distant from another similar clock-work, the circuit from the distant clock-work running through the magnet of the other clock-work, and so that the closing of the circuit at one clock-work will bring the magnet of the other clock-work into corresponding action. This

modification is too apparent to require illustration. Under these modifications which I have described—that is, in which the weight-lever itself does not form one of the contacts for closing the circuit—a spring may be substituted for the weight, as indicated in Fig. 4, for the reason that the momentum which is imparted to the lever, as before described, when the lever forms such contact will be unnecessary, it only being essential that there shall be an active power applied to the lever in a direction to impart movement to the clock-work, as described.

I claim—

1. In combination with clock-work substantially such as described, a ratchet-wheel upon the arbor to be driven, a lever hung concentric with said ratchet and so as to swing in a plane parallel therewith, one arm of said lever weighted, a pawl on the lever, adapted to engage the said ratchet in one direction, but free therefrom in the opposite direction, a magnet, an armature for the magnet, an arm extending from the armature into the path of a corresponding point on the said lever, the said point and the said arm forming metallic contacts, and electrical connections forming a circuit through the magnet, the said lever, and the armature, substantially as and for the purpose described.

2. In combination with clock-work substantially such as described, a ratchet-wheel upon the arbor to be driven, a lever hung concentric with said ratchet and so as to swing in a plane parallel therewith, one arm of said lever weighted, a pawl on the lever, adapted to engage the said ratchet in one direction, but free therefrom in the opposite direction, a magnet, an armature for the magnet, an arm extending from the armature into the path of a corresponding point on the said lever, the said point and the said arm forming metallic contacts, and electrical connections forming a circuit through the magnet, the said lever, and the armature, with mechanism substantially such as described, arranged to operate upon the ratchet-wheel as retaining power while the circuit is closed, substantially as and for the purpose described.

3. In combination with clock-work substantially such as described, a two-armed lever G H, hung upon the arbor to which the power is to be applied, a ratchet in connection with said arbor, so that the rotation of the ratchet will be imparted to the said arbor, the one arm G of the lever weighted, a spring-pawl on the other arm H, adapted to engage the ratchet in one direction, but escape therefrom in the opposite direction, the arm H provided with a metallic contact, as N, a magnet K, an armature L, the armature provided with an arm M, extending into the path of the said contact N and forming a second contact to coact with the said contact N, and an electric circuit through said lever, magnet, and armature, substantially as described.

4. In combination with clock-work substantially such as described, a ratchet-wheel fixed upon the arbor of the clock-work to be driven, a lever hung concentric with said ratchet and so as to swing in a plane parallel therewith, a power, as a weight or spring, applied to said lever, a pawl hung upon said lever and adapted to engage the said ratchet in the direction that the said power of the lever may through said lever serve as the power to drive the clock-movement, a magnet, an armature for the magnet, an arm extending from the armature into the path of a corresponding point on said lever, and an electric connection forming a circuit through the magnet, with means, substantially such as described, to close the said circuit at predetermined times, substantially as described, and whereby upon such closing of the circuit the said lever is turned upon its axis to reapply the said power which the lever carries to the driving of the clock-work.

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