(No Model.)

W. C. HODGKINS.

ELECTRIC SASH BALANCE.

No. 524,250. Patented Aug. 7, 1894.

Fig. 1.

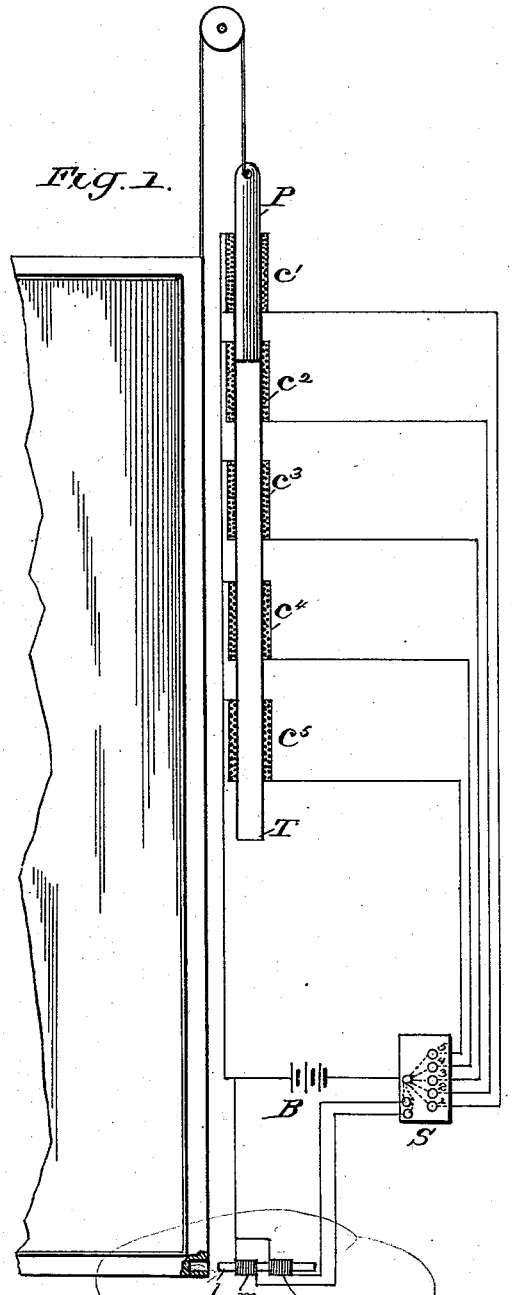
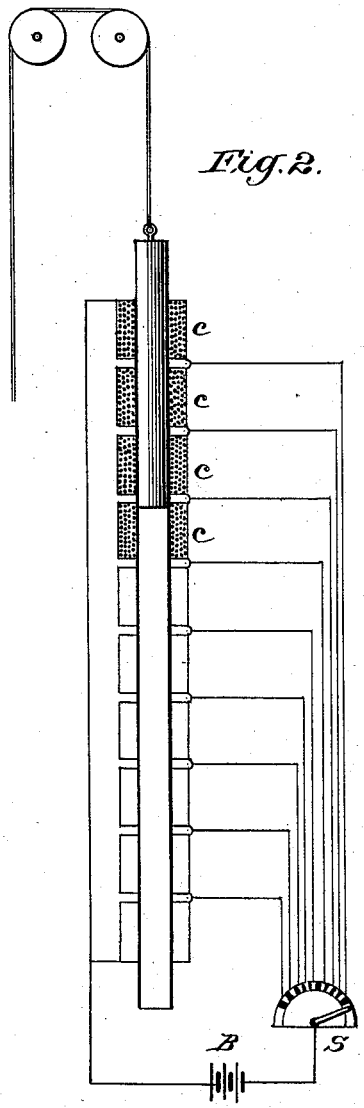


Fig. 2.



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ELECTRIC SASH-BALANCE.

SPECIFICATION forming part of Letters Patent No. 524,250, dated August 7, 1894.

Application filed October 26, 1893. Serial No. 489,201. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CANDLER HODGKINS, of Washington city, in the District of Columbia, have invented a new and useful Improvement in Electromagnetic Sash Adjusters and Locks, of which the following is a specification.

The object of my invention is to provide for the opening and closing of windows or doors and the locking and unlocking of the same, by means of an electric circuit and electro magnets controlled by a switch or push buttons suitably arranged.

To this end it consists of an apparatus composed of a series of hollow coils of insulated wire, preferably of copper, into which coils an iron plunger, or rod, is drawn progressively by the magnetic forces developed in the coils, upon causing an electric current to pass successively through any number of the coils, the said iron plunger forming also at the same time the balance weight of the sash, and being connected to it by a cord passing over a pulley in the usual way. The coils are arranged in alignment at such distances apart that a motion practically continuous (though not uniform) can be obtained, extending over a much greater range than in the ordinary forms of magnets, even of this hollow coil type. This is accomplished by using a plunger considerably longer than a single coil (in general more than twice as long) so that when the pull of any coil upon the plunger becomes extinguished by the plunger reaching a state of equilibrium, its end will be entering the next coil and will be in position to be strongly attracted into that coil when the current is in turn passed through it. The switch or circuit closing device is so arranged that, when desired for the sake of greater uniformity of motion, the current may be passed through two or more coils at the same time.

The invention also consists in an iron plunger or rod similarly actuated back and forth through two or more such hollow coils, which plunger or rod is constructed as a bolt to enter a socket in the sash to lock the same as hereinafter fully described.

The electric current may be obtained either directly from a local primary battery, a storage battery, or from a dynamo-electric machine as may be most convenient.

Figure 1 is a side view of a portion of a window sash with balance weight, cord, and pulley, having my invention applied, the circuit, switch board, and battery being shown diagrammatically, and Fig. 2 shows a modification of the invention.

The drawings show the arrangement of the coils for one sash of a window opening where the distance to be traversed is about three feet and will clearly explain the principle of this application, the details of which must vary with the particular case considered.

In the drawings P denotes the counterpoise weight of the window, which is used as the plunger of the electro-magnet.

c' c^2 c^3 c^4 c^5, are the coils of insulated wire.

B is the battery or other source of electric power.

S is the switch-board; and T is a thin tube passing through the aligned hollow coils to insure the smooth passage of the weight therethrough.

Now if the window is to be raised, the circuit is completed at the push button 2 on the switch board, the coil c^2 becomes magnetic, and the plunger P is drawn into that coil with a force which first increases and then decreases until the plunger is symmetrically located with reference to that coil. Its lower end will then be entering c^3, and the process being repeated as desired, it may be drawn into each succeeding coil. It is also obvious that the window may be stopped at any desired height by merely breaking the circuit, which when push buttons are used will be automatically and successively effected. To lower the window the connections are merely made in the reverse order, and the plunger gradually ascending, the window descends by its own weight. When the required force is such that we need to apply the apparatus to both weights of a sash, the corresponding coils are connected in pairs, so that the one switch controls both weights.

The lower part of the drawings shows the corresponding window-lock, consisting of a bar l of iron or steel and the two hollow coils m and m', which are suitably connected with the battery and the switch-board as shown. The bolt l is considerably longer than the coils. When the current is passed through the coil m, the bolt is drawn forcibly into that

coil, and being much longer than the coil its projecting end enters the socket arranged for it in the sash. To unlock the window the current is passed through m', when the bolt is at once drawn back. This form of lock has the advantage of being entirely inaccessible from the outside of the window. The drawings show these appliances on only one sash, but it is obvious that they can readily be applied to both sashes, as well as to doors of all kinds, especially sliding doors. It is also applicable to the operation of dumb waiters, elevators, &c.

As a modification of the arrangement of circuits in their application to the purposes above named, I may provide a continuous tubular coil wound in any desired number of sections connected with each other, as shown in Fig. 2, but with provision for admitting the electric current at any desired section, from which it may pass in both directions through the coil, the plunger being thus attracted toward the point of admission of the current, and this point being continually shifted by the action of a suitable switch or commutator, the plunger will be drawn progressively along the coil.

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

1. Two or more hollow coils of insulated wire arranged in alignment, a magnetic core or plunger arranged to move through them, a set of electric circuits and switches corresponding to and connecting with the coils, and means for connecting said core with the sash or its described equivalent, substantially as shown and described.

2. Two or more detached hollow coils of insulated wire arranged in alignment and provided with a guide tube extending through them, a magnetic core or plunger arranged to move therethrough, a set of electric circuits and switches corresponding to and connecting with the coils, and means for connecting said core or plunger to the sash or its described equivalent, all combined substantially as shown and described.

3. Two or more hollow coils of insulated wire arranged in alignment, a magnetic core or plunger arranged to move through the same and made of a length greater than that of each coil so as to enter one before leaving another, a set of electric circuits and switches corresponding to and connecting with the coils, and means for connecting the said core or plunger to a window sash or its described equivalent, all combined substantially as shown and described.

4. Two or more hollow coils arranged in vertical alignment and provided with separate electric circuits and switches, combined with a sliding sash or its described equivalent and its balance weight, the said balance weight being connected to the sash by a cord and pulley and passing through and forming the magnetic core of the coils substantially as shown and described.

5. Two or more hollow coils arranged in alignment and provided with independent electric circuits and switches; in combination with a sash or its described equivalent, and a central magnetic core or plunger adjusted in relation to said sash to form a locking bolt substantially as shown and described.

6. A combined electric sash adjusting and locking device consisting of two sets of hollow coils one arranged in alignment vertically and combined with a sash balance weight passing through said coils, and the other set being provided with a central locking bolt, the coils of both sets being provided with independent electric circuits and switches and a suitable generator of electricity substantially as shown and described.

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Witnesses:
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