No. 638,232. Patented Dec. 5, 1899.

C. L. FORTIER.

ELECTRIC EXERCISING APPARATUS.

(Application filed Dec. 12, 1898.)

(No Model.) 2 Sheets—Sheet 1.

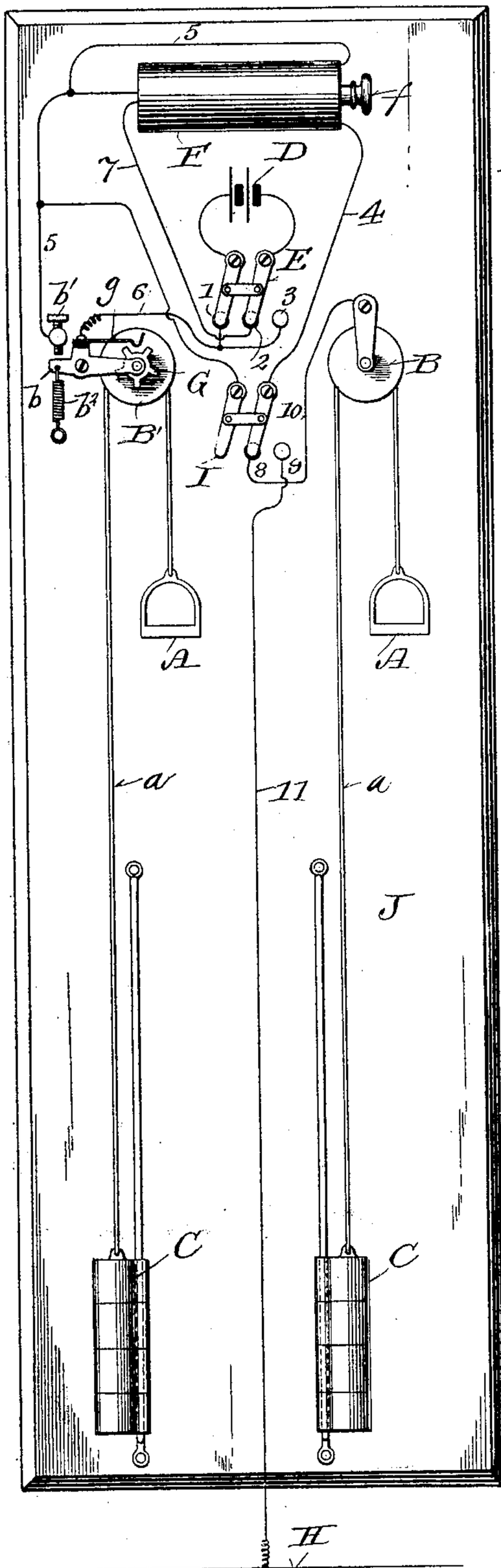

Fig. 1.

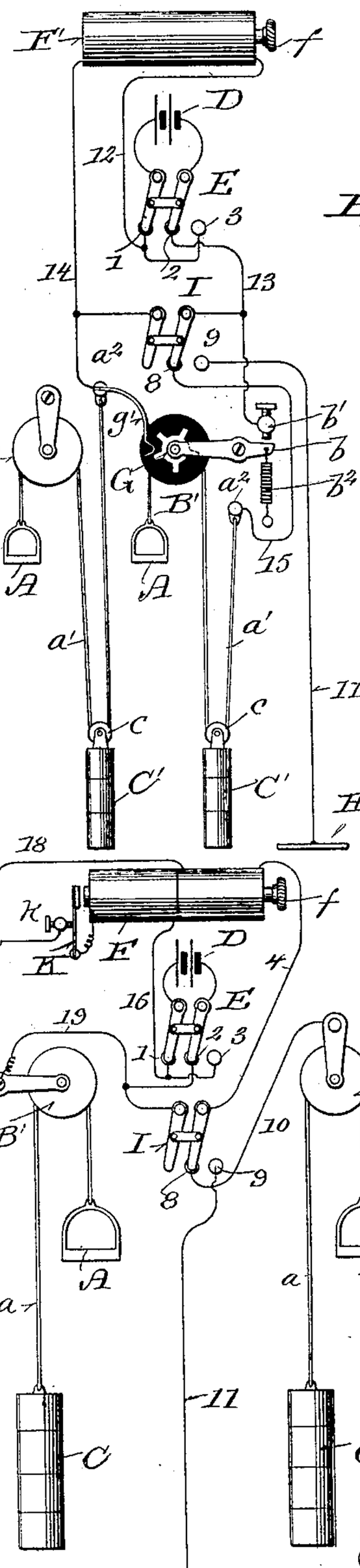

Fig. 2.

Fig. 3.

Witnesses:
Geo. W. Young.
Chas. L. Goas.

Inventor:
Charles L. Fortier,
By Wickliffe Howles Smith & Thurston
Attorneys

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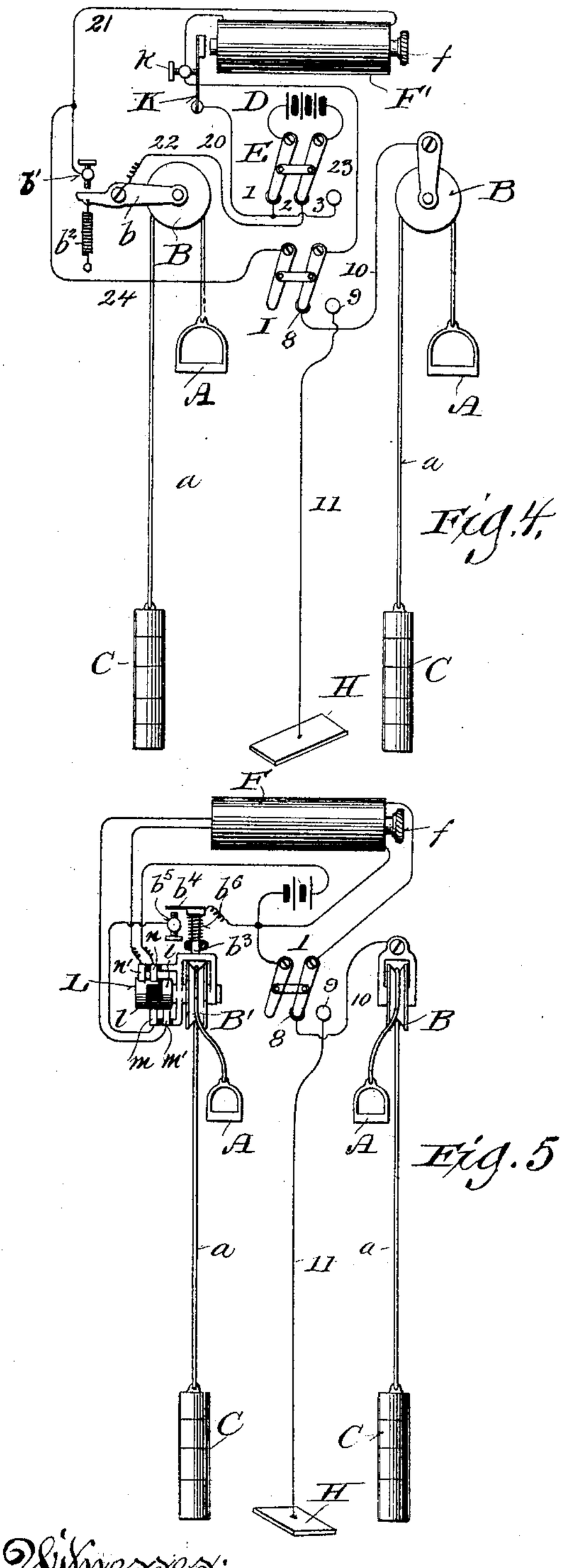

Fig. 4.

Fig. 5

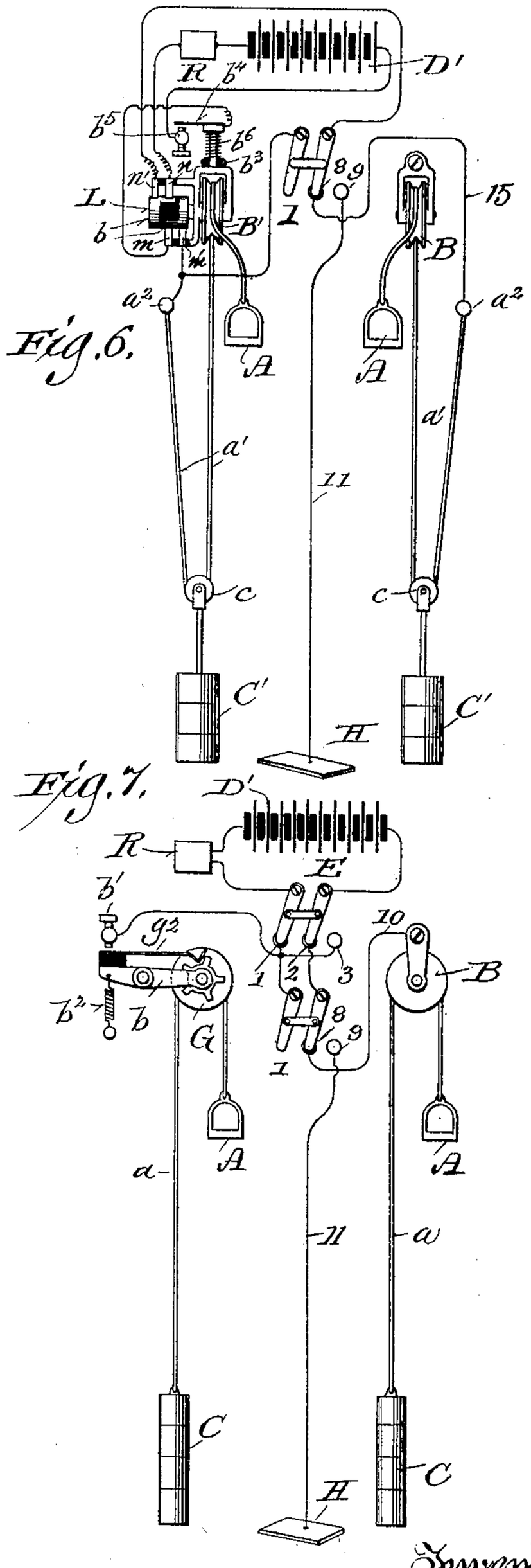

Fig. 6.

Fig. 7.

Witnesses:
Geo. W. Young.
Chas. L. Goss

Inventor:
Charles L. Fortier,
By Wrinkle Flowers Smith Bolton & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES L. FORTIER, OF MILWAUKEE, WISCONSIN.

ELECTRIC EXERCISING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 638,232, dated December 5, 1899.

Application filed December 12, 1898. Serial No. 698,971. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. FORTIER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Electric Exercising Apparatus, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to that class of apparatus in which means for producing a current of electricity through the body or limbs of the operator are combined with means for physical exercise. Its main object is to simplify, cheapen, and improve the construction and operation of apparatus of this class.

It consists of certain novel features of construction and arrangement and combination of parts, as hereinafter particularly described and pointed out in the claims.

In the accompanying drawings like letters and numerals designate the same parts in the several figures.

Figure 1 is a front elevation and diagram of one form of electrical exercising apparatus embodying my invention; and Figs. 2 to 7, inclusive, are diagrams illustrating some of the various modifications of which apparatus embodying the invention is susceptible.

In a general way the apparatus comprises exercising apparatus of a common well-known type, constructed and arranged to afford a variety of muscular or physical exercises, and of electrical devices so connected with the exercising apparatus as to subject the body or limbs of the operator to a current of electricity while exercise is being taken. The exerciser comprises one or more movable handles or hand-grips which serve as the electrodes of an electric circuit and as means for exercising the arms and body, and a mechanical retracting resistance—such as a weight, spring, or elastic cord—connected with each handle, so as to resist the pull of the operator and return the handle when released to its starting-point. The electrical apparatus comprises a source of electricity generated independently of the exerciser, means for controlling the current, changing its course or direction and increasing or varying its strength as desired, and electrical connections for directing the current through different parts of the body and limbs of the operator.

Referring to Fig. 1, A A designate the handles or grips of an exerciser of the class above mentioned. They are made of or provided with conducting material, so as to serve as electrodes for directing a current of electricity through the hands and arms of the operator while exercising with the apparatus. They are attached to flexible conducting-cords *a a*, which pass over pulleys B B′, and are provided at their opposite ends with adjustable weights C C. These pulleys are in the present case, like the handles and cords, made of conducting material and serve as parts of the electric circuit for conveying current to the operator.

D designates a source of electricity produced or generated independently of the operation of the exerciser. In the present instance this generator is represented as consisting of two cells of battery. The poles of the battery are connected with the arms of a pole-changing switch E, the free ends of which are adapted to be moved into engagement either with the contacts 1 and 2 or with the contacts 2 and 3.

F is an induction-coil of the ordinary kind, consisting of primary and secondary coils and an adjustable core *f* for varying the strength of the current.

One of the pulleys B′ of the exerciser is provided with a toothed or notched wheel G, made in the present case of metal or conducting material and adapted to engage intermittently when turned with an insulated spring-contact *g*. This wheel, with the contact-spring, constitutes a circuit-interrupter which, when the exerciser is in operation, breaks and closes the circuit through the primary coil of the induction-coil F, thereby inducing in the secondary coil of the induction-coil a rapid succession of electrical pulsations, which are communicated to the operator through the connections hereinafter explained. The induction-coil, in connection with the circuit-interrupter, serves to increase the strength or tension of the current supplied by the battery, thus augmenting the physiological effect upon the operator and admitting of the employment of a simple bat-

tery or other generator of a normally-feeble current.

The frame or bracket *b*, which carries one of the pulleys B′ of the exerciser, is pivoted to its support or otherwise made capable of limited movement when subjected to the pull of the operator through the cord *a*. It is adapted, when the pulley is depressed, to engage with an insulated stop and electrical contact *b′*; but when it is not subjected to the pull of the operator in working the exerciser it is retracted and held out of engagement with said contact by a spring b^2. The parts last described constitute an automatic circuit-controller by which the primary circuit, including a battery or electric generator, is closed when the apparatus is in use, and is opened, thereby preventing depletion of the battery or waste of current, when the apparatus is not in use.

H designates an electrode for application to any desired part of the body of the operator and for use in connection with either or both of the handles A A. In the present case the extra electrode is shown as a floor-plate for the operator to stand upon, and thus cause, when properly connected, a current of electricity to pass through either or both legs.

I is a double contact-switch for connecting and disconnecting the floor-plate or extra electrode H with the secondary or working circuit of the apparatus and for dividing the current and changing its course through the operator. One arm of the switch I is connected by a conductor 4 with one terminal of the secondary induction-coil, the other terminal of said coil being connected by a conductor 5 with the contact *b′* of the automatic circuit-controller. The conductor 5 has a branch connection with one terminal of the primary induction-coil and a branch connection with the other arm of the switch I. The contacts 1 and 3 of the pole-changing switch are connected by a conductor 6 with the spring-contact *g* of the circuit-interrupter, and the contact 2 of said switch is connected by a conductor 7 with the other terminal of the primary coil of the induction-coil. The switch I is adapted to engage with one or both of two contacts 8 and 9. The contact 8 is connected by a conductor 10 with the metallic or conducting frame of the pulley B, and the contact 9 is connected by a conductor 11 with the floor-plate or extra electrode H.

The several parts of the apparatus may be mounted upon a base or back board J, as shown, or upon any other convenient or suitable support, and are insulated, where it is necessary, in the usual or any well-known manner.

This form of the apparatus operates as follows: In working the exerciser the handles A A are grasped in the usual way and pulled by the operator, so as to alternately raise and lower the weights. The pulley B′, being subjected to the pull of the operator or the weight suspended therefrom, moves the frame or bracket *b* against the tension of spring b^2 into engagement with the contact *b′*, thus closing the circuit at that point. As the wheel G is rotated by the operation of that part of the exerciser the primary circuit, through the generator and primary induction-coil, is alternately closed and broken in rapid succession, producing a series of electrical impulses in the primary coil and a series of corresponding but much stronger impulses in the secondary induction-coil. When the switch I is in the position shown in the drawings, current will pass from the secondary induction-coil through the conductor 4, one arm of said switch, contact 8, conductor 10, pulley B, and the cord and handle of the exerciser in connection therewith, thence through the body and arms of the operator to the other handle and cord, the pulley B′, frame *b*, contact *b′*, and conductor 5 back to the other terminal of said coil. The strength of this current may be varied by adjusting the core *f* of the induction-coil in the usual way. The course of the primary current, with the switch E in the position shown, will be from the battery or generator D through one arm of said switch, contact 1, conductor 6, contact *g*, break-wheel G, frame B, contact *b′*, conductor 5, the primary induction-coil, conductor 7, and contact 2 back through the other arm of said switch E to the other pole of the battery or generator. By turning the switch E to the right, so as to bring its arms into engagement with the contacts 2 and 3, the direction both of the primary and of the secondary currents will be reversed and current will pass through the body of the operator in the opposite direction. By turning the switch I to the right, so that one of its arms will engage with the contact 8 and the other arm with the contact 9, one terminal of the secondary induction-coil will be connected through the conductor 4, one arm of said switch, contact 9, and conductor 11 with the floor-plate or extra electrode H, while the other terminal of said coil will be connected through the conductor 5, contact *b′*, frame *b*, and pulley B′ with one cord and handle of the exerciser, and through one of the branches of the conductor 5, the other arm of switch I, contact 8, conductor 10, and pulley B with the other cord and handle of the exerciser. Thus the current will pass through one or both legs of the operator or any other part of the body to which the extra electrode H is applied and divide through the arms, provided both handles A A are grasped. With the floor-plate or extra electrode H in circuit the handle of the cord passing over pulley B may be dropped and the handle of the other cord passing over pulley B′ grasped and worked with either hand, the entire current in this case passing through that hand instead of dividing, as before, between the two arms and hands. When the handle of the cord passing over the pulley B′ is dropped or released, the spring b^2, retracting the frame *b* from engagement with con-

tact b', immediately breaks the primary circuit, which remains open, thereby preventing waste of current and depletion of battery as long as the exerciser remains out of use.

Referring to Fig. 2, in place of the faradic induction-coil having primary and secondary coils a single self-induction coil F′ is employed, dispensing with separate and distinct primary and secondary circuits. In this case a similar inductive action takes place between separate convolutions of the continuous helical coil and a like or similar effect in increasing the strength or intensity of the current is produced at the electrodes. In this case the flexible cords a' a' of the exerciser are permanently attached at one end to fixed supports a^2, with which the electrical connections are made, as hereinafter explained. The weights C′ C′ are provided with pulleys c c, by which they are suspended upon said cords between their supports a^2 and the pulleys B B′. The pulley B′ is made of or provided with insulating material in such a way as to insulate the cord which passes over it from the break-wheel G, or the same result may be secured by providing the cord with an insulating-covering. The spring-contact g' is attached to the support a^2 of the cord passing over the pulley B. The battery or generator is, as in the apparatus hereinbefore described, connected with the two arms of the pole-changing switch E, the fixed contacts 1 and 3 of which are connected by a conductor 12 with one terminal of the induction-coil, while the contact 2 is connected by a conductor 13 with the contact b' of the automatic circuit-controller and by a branch of said conductor with one arm of the switch I. The spring-contact g' is connected by a conductor 14 with the other terminal of the induction-coil and by a branch with the other arm of the switch I. One contact 8 of the switch I is connected by a conductor 15 with the support a^2, to which the cord passing over pulley B′ is attached, and the other contact 9 of said switch is connected by a conductor 11, as in Fig. 1, with the floor-plate or extra electrode H. In this arrangement of circuits it will be observed that the circuit through the cords, pulleys, and handles of the exerciser or the extra electrode H and one or both of said cords bridges the break in the circuit made by the interrupter between the wheel G and spring-contact g', so that when the circuit through the battery or generator D is broken it will be closed for the induced current through the induction-coil and body of the operator. The manipulation and adjustment of this form of the apparatus are like or so similar to those of the apparatus shown in Fig. 1 that they will be readily understood from the foregoing description, and therefore need no further explanation.

Referring to Fig. 3, illustrating another modification of the apparatus similar in general arrangement to that shown in Fig. 1 and provided with a faradic induction-coil having separate primary and secondary coils, an electromagnetic circuit-interrupter like or similar to those commonly employed with induction-coils is used in place of the interrupter operated by the exerciser, as shown in Figs. 1 and 2. This interrupter consists of a vibrating spring K, carrying an armature in proximity with one end of the induction-coil and bearing normally against a back-stop and contact k. The exercising mechanism and the circuit connections are like or similar to those shown in Fig. 1, except that the fixed contacts 1 and 3 of the pole-changing switch E are connected by a conductor 16 with one terminal of the primary induction-coil, the opposite terminal of said coil being connected with the vibrating spring K of the interrupter and the contact k of said interrupter being connected by a conductor 17 with the contact b' of the automatic circuit-controller. One terminal of the secondary induction-coil is connected by a conductor 18 with the frame b of the pulley B′, which is in turn connected by a conductor 19 with the contact 2 of the pole-changing switch E and with one arm of the switch I, the other arm of the switch I being connected by a conductor 4 with the other terminal of the secondary induction-coil, as in Fig. 1. When the apparatus is adjusted as shown in the drawings and the circuit is closed at b b' by a pull on the cord passing over the pulley B′, current will pass from the battery through one arm of the switch E, contact 1, conductor 16, the primary induction-coil, spring K, contact k, conductor 17, contact b', pulley-frame b, conductor 19, contact 2, and the other arm of switch E back to the battery. The primary induction-coil, being thus energized, will attract its armature and momentarily bend the spring K away from the contact k, breaking the circuit at that point, whereupon the spring K is released and flies back against the contact k, again closing the circuit at that point. Thus the circuit through the primary induction-coil will be momentarily broken and closed in rapid succession. The corresponding pulsations induced in the secondary induction-coil will pass by the conductor 4 to one arm of the switch I, contact 8, conductor 10, pulley B, and the cord passing over said pulley to one handle of the exerciser, thence through the arms and body of the operator to the other handle A of the exerciser, thence to the pulley B′ through the cord passing over it, frame b, and conductor 18 to the other terminal of said coil. The switches E and I are manipulated the same as in the apparatus shown in Figs. 1 and 2 to change the direction of the current and to change its course to and through the electrodes of the exerciser.

Referring to Fig. 4, which shows still another modification, the exercising apparatus is like or similar to that shown in Figs. 1 and 3, and a self-induction coil like or similar to that shown in Fig. 2 and an electromagnetic interrupter like or similar to that shown in

Fig. 3 are employed in connection with switches E and I for changing the direction and course of the current and an automatic circuit-controller for breaking the circuit when the apparatus is not in use, substantially as shown in the preceding figures. In this case the fixed contacts 1 and 3 of the pole-changing switch E are connected by conductor 20 with the spring K of the interrupter, and the back stop and contact *k* of said interrupter are connected with one terminal of the induction-coil. The other terminal of the induction-coil is connected by a conductor 21 with the contact *b'* of the automatic circuit-controller. The middle contact 2 of the switch E is connected by conductor 22 with the frame *b* of the pulley B'. One arm of the switch I is connected by a conductor 23 with the contact *k* of the interrupter or with one terminal of the induction-coil. The other arm of said switch is connected by a conductor 24 with the conductor 21 or with the other terminal of the induction-coil. When the circuit is closed at *b b'* by a pull on the cord passing over the pulley B', current flows from the battery or generator D through one arm of the switch E, contact 1, conductor 20, spring K, contact *k*, thence through the induction-coil, conductor 21, contact *b'*, pulley-frame *b*, conductor 22, contact 3, and the other arm of the switch E back to the battery. The vibrating spring K operates, as before explained, to rapidly break and close this circuit, thereby producing by induction in the coil F' intensified pulsations, which, in the position of the apparatus shown in the drawings, pass from one terminal of the coil through the conductor 21, contact *b'*, pulley-frame *b* to the pulley B' and the cord and handle associated therewith, thence through the arms and body of the operator to the other handle of the exerciser, thence through the pulley B, conductor 10, contact 8, one arm of the switch I, conductor 23, back to the other terminal of said coil. When the switch I is turned to the right, the current will pass from the conductor 23 through one arm of said switch, contact 9, and conductor 11 to the floor-plate or extra electrode H, thence through the body of the operator and dividing through the arms, if both handles A A are grasped, will pass through and from the pulley B, through conductor 10, contact 8, the other arm of said switch, and conductors 24 and 21 back to the induction-coil. From the other pulley B' the current will pass through the frame *b*, contact *b'*, and conductor 21 to the induction-coil. By turning the switch E to the right the direction of the current will be reversed, the switch I being placed in either position.

While the electromagnetic-circuit interrupter K *k* shown in Figs. 3 and 4 may be employed in place of that shown in Figs. 1 and 2, I prefer the latter, because it can be constructed or adjusted to break the circuit with less rapidity than the other, and thus allow the muscles to relax between the electrical pulsations, which produce contraction, whereas the pulsations produced with the interrupter K *k* follow each other in such rapid succession that the muscles are not allowed sufficient time to relax or fully relax between the successive pulsations, and consequently the current is less effective and beneficial.

In Fig. 5 I show another modification of the apparatus in which a different form of circuit-interrupter is employed in connection with an induction-coil, taking the place not only of the interrupting devices shown in the preceding figures, but also of the pole-changing or current-reversing switch E. A modified form of the circuit-controller for breaking the circuit when the apparatus is not in use is also shown in this figure. The frame of the pulley B' is provided with a stem b^3, which is movable vertically in a suitable support and is provided with a contact b^4, adapted, when the pulley-frame is depressed by a pull on the weight-cord, to engage with an opposing contact b^5. A spring b^6 tends to move the contact b^4 out of engagement with the contact b^5 when the associated handle of the exerciser is released, and thus break the circuit when the exerciser is not in operation. Upon the extended axle of the pulley B' is mounted a cylinder L, provided with contact-plates *l l*, which are insulated from each other and from said pulley. Upon opposite sides of said cylinder are arranged insulated spring-contacts or brushes *m m'* and *n n'*, which are carried by arms on the pulley-frame. One contact or brush of each pair on each side of the cylinder engages constantly with one of said plates *l*, while the other contact or brush engages successively with both plates when the cylinder is rotated. Thus each of the two contacts or brushes nearest the ends of the cylinder are electrically connected alternately with each of the other two contacts or brushes when the cylinder is rotated. When either of the two inner contacts or brushes *m* or *n* is between and out of engagement with the plates *l l*, the circuit is broken. This device serves not only the purpose of the interrupter G, (shown in Figs. 1 and 2,) or of the electromagnetic interrupter K, (shown in Figs. 3 and 4,) to alternately break and close the circuit and produce pulsations at the electrodes of the exerciser, but also to reverse the direction of the current or produce alternating pulsations of equal strength. For this reason the pole-changing or current-reversing switch E (shown in the preceding figures) may be dispensed with. One pole of the battery or generator D is connected with the brush *n* of the current-reversing interrupter. The other pole of said battery is connected with the contact b^4 of the automatic circuit-controller, and the contact b^5 is connected with the brush *m* of said interrupter. One terminal of the primary induction-coil is connected with the brush *m'* and the other terminal of said coil is connected with the brush

n'. One arm of the switch I is connected with one terminal of the secondary induction-coil and the other arm of said switch is connected with the other terminal of said coil and with the contact b^4 or with the pulley B′ through its frame. The contacts 8 and 9 of said switch are connected with the frame of pulley B and with the floor-plate or extra electrode. When the circuit is closed at b^4 by the depression of the pulley B′ in the operation of the exerciser, current passes from one pole of the battery D to the brush n, thence to the brush n' or to the brush m', according to the position of the cylinder L, or is momentarily interrupted when said brush n is out of contact with both of the plates l. When the two brushes n and n' are in contact with the same plate, the current will pass from the brush n' through the primary induction-coil to the brush m', thence to the brush m, bearing on the same plate l, and thence through the contacts b^5 and b^4 back to the other pole of the battery. When the brushes of each pair $m\ m'$ and $n\ n'$ bear on different plates, the current will pass from the brush n to the brush m', thence through the primary induction-coil in the reverse direction back through the brush n', thence to the brush m back to the other pole of the battery, as above explained. Thus by the rotation of the cylinder L in the operation of the exerciser the current will be interrupted and reversed through the primary induction-coil with greater or less rapidity, according to the construction and arrangement of the contact-plates of cylinder L and according to the speed with which said cylinder is turned. The pulsations of current produced, as above explained, in the primary induction-coil induce corresponding alternating pulsations of increased intensity in the secondary coil, from which they are conducted to the electrodes of the exerciser through the connections above described and in a manner which will be readily understood from the explanation of the preceding figures.

In Fig. 6, showing another modification of the apparatus, a battery or generator D′, adapted to supply a current of the maximum strength required for the exerciser without an induction-coil, is employed. In this form of the apparatus I have shown an exerciser substantially like that illustrated in Fig. 2 and a current-reversing interrupter and an automatic circuit-controller like those shown in Fig. 5. One brush m of the interrupter is connected through the contacts b^4 and b^5 of the circuit-controller with one pole of the battery, and the corresponding brush n on the opposite side of the cylinder L is connected with the other pole of the battery. The brush m' is connected with one of the binding-posts or cord-supports a^2 of the exerciser and with one arm of the switch I, and the remaining brush n' is connected with the other arm of said switch. The other electrical connections are substantially like those shown in the preceding figures and hereinbefore described. In some convenient part of the circuit, as between the battery and the brush n, is inserted adjustable resistance R to vary the strength of the current as desired. The manipulation and operation of this form of apparatus will be readily understood from the description of the preceding figures and the explanation of the operation of the apparatus therein shown.

In Fig. 7 is shown another modification of the apparatus containing a battery or generator D′ like that shown in Fig. 6, and a circuit interrupter and controller similar to those shown in Fig. 1, the construction of the exercising apparatus being like or similar to that shown in Figs. 1, 2, and 4. With this form of the apparatus, employing an interrupter which does not change the direction of the current, I use a pole-changing or current-reversing switch E, as in the forms shown in Figs. 1, 2, 3, and 4. The circuit-interrupter differs from that shown in Fig. 1 in that the contact-spring g^2 is arranged to be moved into and out of engagement with the stop-contact b' of the automatic circuit-controller. Adjustable resistance R is provided in some convenient part of the circuit, as in the form of apparatus shown in Fig. 6, to reduce or vary the strength of the current, as desired. The poles of the battery or generator are each connected with one arm of the switch E. The contacts 1 and 3 of this switch are connected with the contact b' of the automatic circuit-controller and also with one arm of the switch I. The other arm of switch I is connected with the contact 2 of switch E. The other electrical connections are substantially like those of the preceding figures. The operation of this form of apparatus is like or similar to the other forms shown in the preceding figures and will be readily understood from the description thereof.

In Figs. 1, 2, 3, 4, and 7 the pulleys of the exerciser are shown at right angles to the positions which they would naturally and ordinarily have in practice.

Various changes in details of construction and arrangement of parts other than those specifically mentioned may be made in the apparatus without material change in the results attained and without departure from the principle and intended scope of the invention.

I claim—

1. The combination with an exerciser, comprising a movable electrode and retracting resistance, of a source of electricity generated independently of the exerciser, and a circuit-controller constructed and arranged to close the circuit when the exerciser is put in operation and to automatically break the circuit when the exerciser is not in use, substantially as and for the purposes set forth.

2. The combination with an exerciser, comprising two or more electrodes, one or more of which is movable, and retracting resistance for each exercising-electrode, of a source of electricity generated independently of the

exerciser, and a switch for closing or opening the circuit through one or more of said electrodes, substantially as and for the purposes set forth.

3. The combination with an exerciser, comprising a movable electrode and retracting resistance, of a source of electricity generated independently of said exerciser, and means for changing the direction or polarity of the current through said electrode, substantially as and for the purposes set forth.

4. The combination with an exerciser comprising a pair of movable electrical conducting handles and retracting resistance connected with said handles, of a source of electricity generated independently of the exerciser, an extra electrode for application to a part of the operator, and a switch arranged to direct the current through said handles or through said extra electrode and the handles of the exerciser, substantially as and for the purposes set forth.

5. The combination with an exerciser comprising a pulley having a movable frame or support constituting a part of a circuit-controller, a conducting handle or electrode attached to a flexible cord passing over said pulley and provided with retracting resistance, an electrical contact arranged to be engaged by the pulley-frame when the handle of the exerciser is subjected to a pull, and a source of electricity generated independently of the exerciser, substantially as and for the purposes set forth.

6. The combination with an exerciser comprising a pulley and a movable electrode attached to a flexible cord or the like passing over said pulley, of a source of electricity generated independently of the exerciser, and a circuit-interrupter consisting of a break-wheel actuated by said pulley, and a contact adapted to be engaged by said break-wheel and to successively close and break the circuit including said source of electricity, substantially as and for the purposes set forth.

7. The combination with an exerciser comprising pulleys and conducting-handles attached to cords passing over said pulleys, of a source of electricity generated independently of the exerciser, an induction-coil for increasing the strength or intensity of the current, a circuit-interrupter consisting of a break-wheel actuated by one of said pulleys and a contact arranged to be engaged thereby for successively opening and closing the circuit through said induction-coil, and an automatic circuit-controller adapted to close the circuit when the exerciser is in operation and to break the circuit when the exerciser is not in operation, substantially as and for the purposes set forth.

8. The combination with an exerciser comprising pulleys and conducting-handles having flexible connections, passing over said pulleys, with retractile resistance, of a source of electricity generated independently of the exerciser, an induction-coil for increasing the strength or intensity of the current, a pole-changing switch for reversing the direction of the current through said handles, a circuit-interrupter consisting of a break-wheel actuated by one of said pulleys, and of a contact adapted to be engaged thereby, and an automatic circuit-controller for closing the circuit when the exerciser is in opration and opening the circuit when the apparatus is not in use, substantially as and for the purposes set forth.

9. The combination with an exerciser comprising a pair of pulleys and conducting-handles having flexible connections, passing over said pulleys, with retracting resistance, of a source of electricity generated independently of the exerciser, an induction-coil for increasing the strength of the current, a circuit-interrupter for successively breaking and closing the circuit through said induction-coil, an automatic circuit-controller adapted to close the circuit when force is applied to one of said handles and to open the same when said handle is released, an extra electrode for application to a part of the operator, and a switch for changing the course of the circuit through said extra electrode and the handles or through the handles only, substantially as and for the purposes set forth.

10. The combination with an exerciser comprising a pair of pulleys and conducting-handles having flexible connections, passing over said pulleys, with suitable retracting resistance, of a source of electricity generated independently of the exerciser, an induction-coil for increasing the strength of the current, a pole-changing switch for reversing the direction of the current, a circuit-interrupter consisting of a break-wheel actuated by one of the pulleys, and of a contact adapted to be successively engaged by said break-wheel, an automatic circuit-controller adapted to close the circuit when one handle of the exerciser is subjected to a pull and to open the circuit when said handle is released, an extra electrode for application to any desired part of the operator, and a switch for changing the course of the current through said extra electrode and handles, substantially as and for the purposes set forth.

In witness whereof I hereto affix my signature in presence of two witnesses.

CHARLES L. FORTIER.

Witnesses:
CHAS. L. GOSS,
M. L. EMERY.