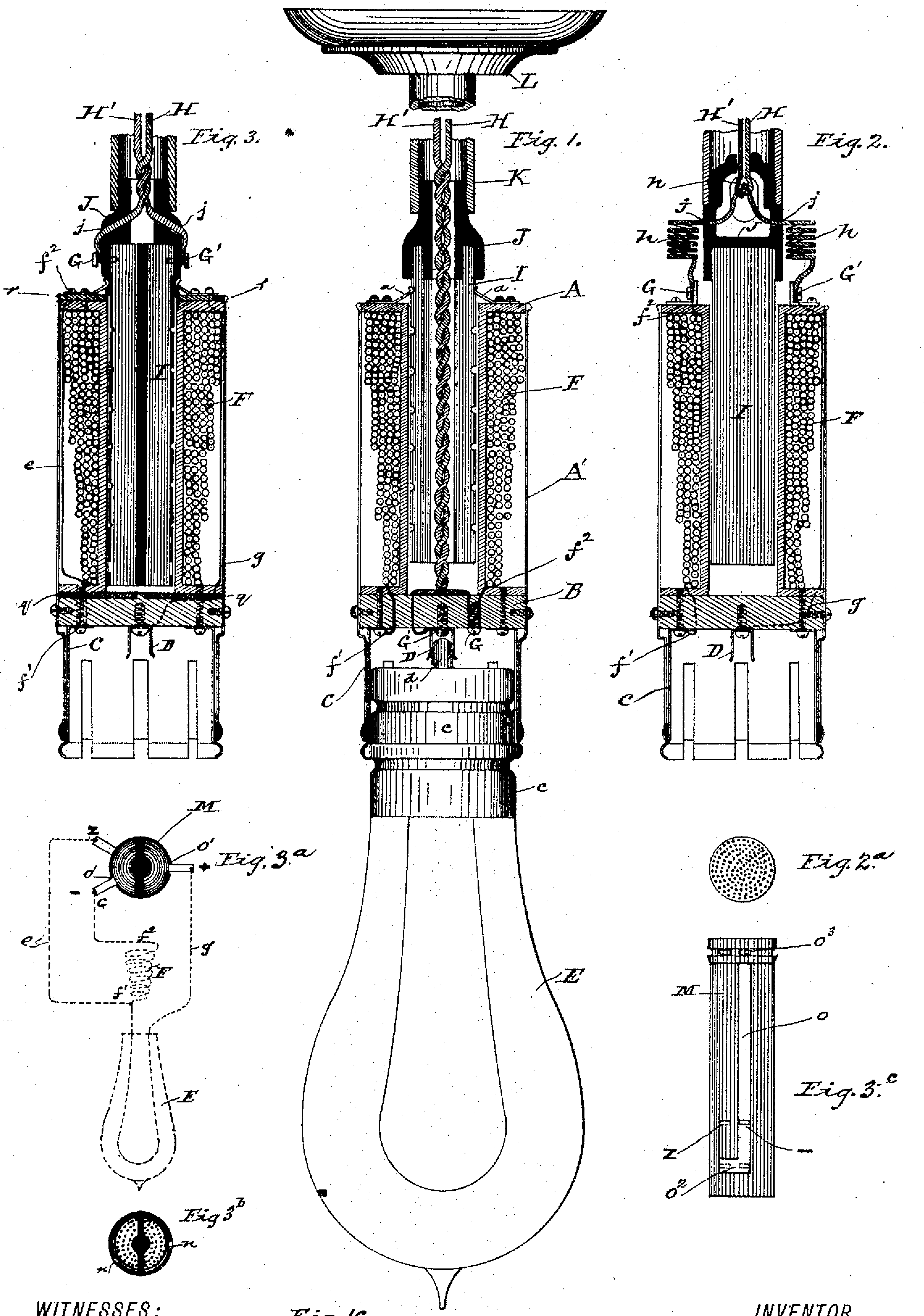
(No Model.)

E. E. RIES.

RREGULATING SOCKET FOR INCANDESCENT ELECTRIC LAMPS.

No. 488,951. Patented Dec. 27, 1892.



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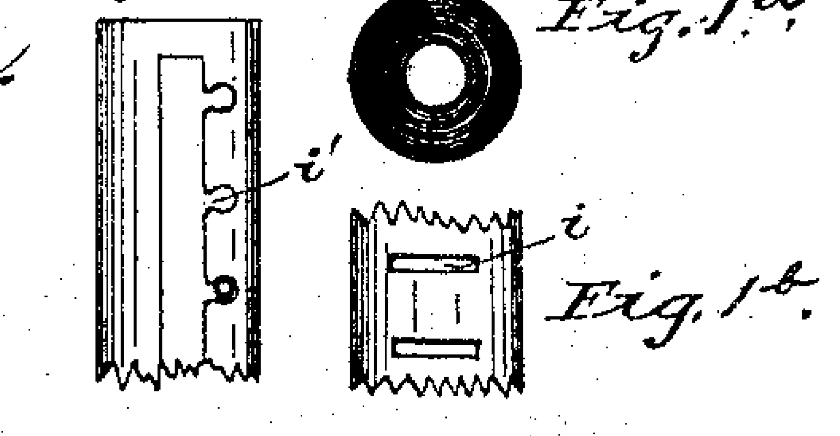

INVENTOR

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REGULATING-SOCKET FOR INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 488,951, dated December 27, 1892.

Application filed July 6, 1891. Serial No. 398,578. (No model.)

To all whom it may concern.

Be it known that I, ELIAS E. RIES, a citizen of the United States, residing at Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in Regulating Sockets or Holders for Incandescent Electric Lamps, &c., (Case A,) of which the following is a specification.

My invention has reference to regulating sockets or holders designed more particularly for alternating or intermittent current incandescent electric lamps, &c., in which the intensity of the light emitted by the lamp is varied by setting up or generating within the lamp socket itself in the circuit of the filament a variable counter electro-motive force or current tending to oppose to a greater or less extent, as desired, the flow of current to the lamp, and thus permit the degree of incandescence of the lamp filament to be readily, effectively and economically controlled.

The object of my invention is, broadly speaking, to provide a socket or holder for incandescent lamps and other translating devices so arranged and constructed that the amount of electrical energy supplied to the lamp or other device, may be varied at will without the waste of energy that has heretofore characterized the operation of sockets in which resistance wires or their equivalents were employed. When a number of incandescent lamps or translating devices are operated from the same constant-potential supply circuit, as is the usual practice, it is especially desirable to provide a socket that, without unnecessary waste of current, will permit of regulating the brilliancy of its particular lamp, or of controlling the working electro-motive force of its individual translating device, without at the same time affecting or interfering with the flow of current to other lamps or translating devices on the same circuit, and which will not be open to the objections incident to the installation and use of separate wall regulators or choking apparatus such as have heretofore been proposed for regulating groups of lamps. It is one of the objects of my invention to supply these requirements, and to do this in such a manner that the flow of current to the translating device can be gradually increased or diminished, or cut off altogether if desired, in a simple, economical and efficient manner.

My invention may assume a great variety of forms, and while I have shown several modifications of one general type in the accompanying drawings, I am by no means confined to the identical construction or type of my invention shown. In another application of even date, Serial No. 398,579 I have shown and described a modification of my invention in which the regulation is effected by a step-by-step action and in which such regulation is obtained by varying the number of active convolutions in circuit, the core itself being stationary, while in the present instance I have illustrated a preferred type of my invention in which the regulation is effected gradually and uniformly by moving the core and thus varying the number of convolutions subjected to magnetic action, and it is obvious that other well known or desirable methods may be employed by me for this purpose without departing from the scope of my invention.

Referring now to the accompanying drawings, Figure 1 is an elevation, partly in section, showing my improved regulating socket with an ordinary incandescent lamp attached; Figs. 1^a, 1^b, and 1^c, detail views of the core, I, shown in Fig. 1; Fig. 2, a sectional elevation of a slightly modified form of regulating socket; Fig. 2^a, a detail sectional view of the laminated core, I, of Fig. 2; Fig. 3, a sectional elevation of another modification of the regulating socket shown in Fig. 1; Figs. 3^a, and 3^b, sectional views of the core shown in Fig. 3, and a diagrammatic view in dotted lines of the circuit connections, and Fig. 3^c an elevation of the insulating sheath, M, shown in Fig. 3.

Similar letters of reference refer to corresponding parts throughout the several views.

A represents a spool or bobbin of non-conducting material, such as compressed fiber, and B a disk of the same or equivalent material, the latter constituting the base of the socket. To the disk B are secured the contact terminal springs, C, D, that engage with the corresponding terminals c, d, of the base of the lamp or other translating device E. To the disk B is also secured the inclosing shell or tube A′, as shown.

The sleeve A, before its attachment to the base B, is wound with a number of turns of insulated copper wire in one or more sections the whole forming a coil or solenoid E, that is preferably thickest at the end farthest from the lamp E, as shown. One end, f', of the coil F is permanently attached to the lamp contact terminal, C, the other end f^2 of the coil being in electrical connection with the binding screw G, to which one of the leading-in wires, H, is attached. The other leading-in wire H′ is connected to the binding screw G′, which is in electrical connection with the lamp contact terminal D, either directly as shown in Fig. 1, or by the wire g as indicated in Figs. 2 and 3. It will thus be seen that the coil F is in series with the lamp E or other translating device when the latter is placed in the socket.

Within the solenoid F, separated therefrom and guided by the wall of the spool A, is a laminated soft iron core I. This core is attached by means of a suitable coupling-joint J, of hard rubber or insulating fiber, to the fixture, K, that forms part of the lamp-supporting, bracket or electrolier.

In the construction shown in Fig. 1, the core I, is hollow so as to permit the passage of the leading-in wires and is made of a thin sheet of soft iron provided on one side with a suitable insulating coating of varnish, paper or the like, and rolled up in the form of a close spiral as shown in the sectional view, Fig. 1^a. The portion of the sheet forming the outer layer is slightly indented or notched at intervals as shown in Fig. 1^b. These notches are designed to be engaged by light springs a, a, attached to the top of the spool A, the object of these springs being to hold the socket in any desired position along the core and also to prevent it from changing its position upon the same when the socket is in operation. Instead of the notches and springs already described, a core having its outer layer slotted in the manner shown in Fig. 1^c, and engaging with a suitable pin fixed to the spool, may be used to advantage.

The operation of the socket as far as described will now be readily understood. Assuming the core I to be partially within the coil F, the alternating or intermittent current flowing around the coil will set up an alternating magnetic field in the core I and the space immediately surrounding same, which in turn will generate a counter electro-motive force or induced current in such of the convolutions of the coil F as may at the time encircle the core. This counter electro-motive force opposes the direct electro-motive force of the supply circuit and therefore causes a diminution in the flow of current through the lamp E or other translating device. As the lamp or socket is pushed up along the core, the number of convolutions subjected to the direct inductive action of the core gradually increases, and the light given forth by the lamp gradually and steadily diminishes, and vice versa, when increased light is required all that is necessary is to pull the lamp E or the socket containing it down to the desired extent. The lamp is kept at any degree of brilliancy by means of the notches i or i' already referred to, which serve to prevent the lamp from varying the position upon the core in which it may be placed.

When the socket illustrated in Fig. 1 is used as shown, with the leading in wires H, H, passing through a rigid lamp fixture, a certain amount of slack is to be allowed in that portion of the wire passing through the fixture K, L, sufficient to permit of extending the lamp the full length of the core I. This slack, if desired may be taken up by giving a portion of the conducting cord a spiral form within the pipe K of the fixture, or by means of a suitable spring or counterweight within the portion L of the fixture. It will be understood that in some cases the socket itself may be secured to the supporting fixture in any desired position and the light regulated by moving the core, which in such cases is provided with a convenient key or knob to take the place of the insulating coupling J.

In the construction shown in Fig. 2, the core I is composed of a bundle of soft iron wires, shown in section in Fig 2^a, and secured at one end within the lower cup-shaped recess of the insulating joint J. The construction of this core is such that the spool A containing the coil F will slide over it and remain in any desired position thereon by ordinary friction. The leading in wires H in this case pass through a contracted opening in the upper portion of the piece J, so that the same may be knotted as shown at h on the under side of said opening, and thus be prevented from being drawn through the opening by the weight of the socket and lamp when the latter are to be suspended from the conducting wires H instead of the fixture K. The ends of the leading in wires are then passed out through two small openings j j in the sides of the piece J, and connect with two resilient conducting springs h, h, that connect with the binding screws G G′ of the socket, or are themselves formed into such springs, as shown. These springs serve to maintain connection with the lamp socket at any desired position along the core, the operation of the socket being the same as that already described with reference to Fig. 1.

In Fig. 3 I have shown still another arrangement of my regulating socket. In this arrangement the necessity for flexible connections between leading in wires and the socket is avoided, and it also differs from the sockets already described in being provided with that portion of my invention which has for its object the complete turning on and off of the current flowing to the lamp or other device when the position of the regulating mechanism corresponds to the points of greatest and least flow of current respectively.

Referring to Figs. 3 and 3[a], it will be seen that the soft iron core I is formed in two sections that are inclosed within, and electrically separated from each other, by a sheath or tube M of insulating material having a dividing rib *m* extending therethrough. As shown in section in Fig. 3[a], this core is built up of thin semi-circular strips or laminæ of soft iron snugly filling the space at both sides of the dividing rib *m*. In practice, however, I prefer to make use of the arrangement shown in Fig. 3[b], in which two semi-circular strips *n*, *n*, of iron, brass, copper or other good conductor are placed immediately within the walls of the insulating sheath M, the space between these and the rib *m* being filled with soft iron wires. As will be seen by reference to Fig. 3, the binding screws G, G′ of the socket, to which the leading wires H, H are attached, are carried by and make direct electrical contact with the two halves of the core I, respectively. The insulating sheath M is provided with two slots *o*, *o′*, one of which is shown in Fig. 3[c], which extend nearly, but not quite, the entire length of the sheath on opposite sides, and serve to expose the outer conducting strips *n*, *n*, of the core. To the upper end of the spool A are secured three contact brushes, marked —, +, Z, in the diagram view. The brushes — and + normally make contact with the outer semi-circular strips *n n* of the divided core I through the slots *o*, *o*, while the brush Z ordinarily rests upon the insulated sheath M. The brush — takes the alternating or intermittent current fed by one of the supply wires H to one side of the divided core I, at the binding screw G, said current passing through the solenoid F to the contact spring C that connects with one terminal of the lamp E, thence through the lamp filament and by way of the other lamp terminal to the contact spring D, thence over the connecting wire *g* to the brush + and opposite side of the core I to the binding screw G′ and to the other supply wire H. The brush Z is likewise connected by a wire *e* with the contact spring cup C, and serves to short-circuit the coil F when the brushes —, +, occupy the position upon the core shown at o^2 in Fig. 3[c]. It will now be clear that when the core I is entirely within the socket, as shown in Fig. 3, the springs Z, —, and + will all rest upon the upper portion of the insulating sheath M, in the position shown at o^3 in Fig. 3[c], and the flow of current to the lamp or other device will be absolutely cut off. If now the core be slightly withdrawn, by pulling the socket downward or otherwise, the springs — and + will enter the slots *o* and *o′* and establish connection between the coil and lamp and the plates *n n* of the core respectively, as already described. The relation of the parts will then be such that the coil F will exert its greatest choking or retarding action, and the lamp will burn at its lowest degree of incandescence. As the core is withdrawn still farther, the number of convolutions subjected to inductive action is diminished, and the flow of current to the lamp correspondingly increased, the lamp glowing gradually brighter and brighter as the core is withdrawn until finally the latter is no longer in a position to generate an appreciable counter electro-motive force, whereupon the coil F is automatically short-circuited by the entrance of the spring Z into the slot *o*, as already explained, thus eliminating whatever "passive" or "dead" resistance might otherwise be introduced by the coil, and permitting the lamp to burn at its greatest brilliancy. In short, all that is necessary to raise the lamp from total extinction to the maximum or any other desired degree of brilliancy, or vice versa, by means of the particular form of my socket just described, is to slide the socket along its core to the desired extent and in the proper direction.

To increase the inductive action of the core I, the heads of the spool A may each be provided with two semicircular iron disks or rings, *q q* and *r r* respectively. The inclosing shell *g*, which in such case would be of iron, [or if desired, a separate iron shell within the same and immediately surrounding the solenoid F,] would make contact with the divided disks and rings, the whole constituting a magnetic shell or envelope surrounding the coil F and forming, in conjunction with the core I when the latter is within the coil, a complete magnetic circuit for the same, the strength of which is weakened in proportion as the core is withdrawn. It should be stated here that the magnetic shell, or if no separate shell be used, that portion of the inclosing shell *g* surrounding the coil F, should be slotted in order to prevent the generation of induced currents therein, which might otherwise impair the efficiency of the coil and socket.

One of the objects in making the solenoid or reaction coil F of conical form as illustrated is to prevent too great a loss of current by reason of the ohmic resistance of that portion of the coil not subject to inductive influence, when the lamp is burning at some intermediate degree of incandescence with the core partially withdrawn. In some cases, where it is desirable to eliminate this loss altogether, I wind the solenoid F in separate sections and connect the ends of these sections in such a manner that as the core I is withdrawn the sections will automatically be cut out or short circuited one after another. I find, however, that the choking or reaction coil F when properly constructed may be made of such low resistance that the amount of current absorbed by it and converted into heat when the core is fully withdrawn will be but a very small fraction of that passing through the lamp, so that the refinements referred to may ordinarily be dispensed with. Besides this, a single coil such as described has the advantage that the regulation of the light throughout its entire range is perfectly regular and uniform, which would not ordinarily be the case where a sectional coil is employed provided with a movable core, as above described, or with a fixed core as described and claimed in my concurrent application before referred to, [Serial No. 398,579,] From what has been said it will be evident that the construction of this type of my improved socket is such that as the lamp is drawn downwardly into position for use the lamp is automatically lighted and its light gradually increased until the filament glows at its greatest degree of brilliancy, and vice versa, when the lamp is pushed upward out of the way the degree of incandescence of the filament is gradually reduced and the light finally extinguished. This method of regulation is of especial value in the case of reading, or students' lamps, and in numerous other instances where the lamps are placed within reach, as in the case of lamps for desk or table use. It will also be evident that instead of attaching the lamp holding terminals or receptacles to the solenoid, the same may be attached to the core itself, in which case the solenoid or counter electro-motive force coil would be secured to the fixture K and the core I would be movable within the same. Numerous other modifications of my invention besides those already mentioned will suggest themselves.

It will be apparent that by means of my invention the strain upon the lamp filaments due to the usual sudden turning on and off of the light is entirely avoided, and that lamps of a given voltage, or of any voltage less than that existing between the terminals of the circuit or leading in wires can be safely burned at any desired degree of brilliancy and efficiency entirely independent of other lamps upon the same circuit. By means of my invention a lamp may be diminished upon leaving a room, or for use as a night lamp, without the necessity of extinguishing it, and will give just sufficient light to show its position in the dark so that the same may be readily reached for the purpose of turning up the light whenever it may be required. In fact in many other cases it is of great importance to enable the consumer to regulate the brilliancy of any one or more of a number of incandescent lamps at the lamp itself in a simple and convenient manner and without useless waste of current, and this I accomplish in an effective and exceedingly simple manner by means of my invention. My invention is not only intended for and applicable to regulating sockets designed to hold incandescent lamps, but also to regulating sockets or holders for other translating devices such as electric heating apparatus, soldering irons &c., in which the working electro-motive force requires to be controlled at the device itself, as well as to sockets for holding and supplying current to small electric motors, such as those used for running ventilating fans, and for other purposes.

Having now fully described my invention, I claim and desire to secure by Letters Patent:—

1. A regulating socket for incandescent electric lamps, &c., provided with a self inductive conductor within the socket, in the filament circuit, and means for varying the degree of self-induction of said conductor.

2. A socket for incandescent electric lamps, &c., provided with a self-inductive conductor within the socket and in series with the lamp filament or other translating device, and means for varying the degree of self-induction of said conductor.

3. A regulating socket for incandescent electric lamps, &c., provided with a counter electro-motive force coil or reaction device, within the socket and in the filament circuit and means for varying the counter electro-motive force generated by the said coil or device.

4. A regulating socket for incandescent electric lamps and other translating devices having a counter electro-motive force coil or reaction device within the socket and normally in series with the lamp filament or other device, and provided with means for varying the counter electro-motive force or current generated by the said coil or device.

5. A regulating socket for incandescent electric lamps and other translating devices, said socket containing a reaction coil or counter electro-motive force generator normally in series with the lamp filament or other device, and having a switching device arranged to cut out or short circuit the said coil, substantially as and for the purpose described.

6. A regulating socket for incandescent electric lamps and other translating devices, said socket containing a reaction coil or counter electro-motive force generator normally in series with the lamp filament or other device and a switching device for varying the amount of electro-motive force generated and for cutting out or short circuiting the said generator or coil.

7. A regulating socket for incandescent electric lamps and other translating devices, said socket having a reaction coil or counter electro-motive force generator normally in series with the lamp filament or other device and having a switching device operated by a movement of the lamp or lamp holder itself for varying the amount of counter electro-motive force generated.

8. A regulating socket for incandescent electric lamps and other translating devices, said socket containing a variable counter electro-motive force generator or other current regulating device, and having a switch designed and adapted to be operated by a movement of the lamp or lamp holder itself for varying and controlling the supply of current to the lamp or other translating device.

9. A regulating socket for incandescent electric lamps and other translating devices, said socket comprising a stationary portion arranged and adapted to be secured to a suitable fixture, a movable portion containing the holder or receptacle for the lamp or other translating device, a variable counter electromotive force generator or other current regulator, and suitable circuit making and breaking devices, the whole arranged to be operated by a movement of the lamp or translating device to establish the circuit and to vary the amount of current flowing through the same in accordance with the position of the lamp or translating device, substantially as described.

10. A socket or holder for incandescent electric lamps and other translating devices supplied with alternating or intermittent currents, the same comprising a contact making receptacle or holder for the translating device secured to a suitable base or support, a reaction coil or counter electro-motive force generator also secured to the said base or support and so arranged as to be included in the circuit of the translating device, an inclosing shell for the receptacle, base and reaction coil, and means for varying the amount of counter electro-motive force or current generated by the said reaction coil or generator, substantially as set forth.

11. A socket or holder for incandescent electric lamps and other translating devices supplied with alternating or intermittent currents, the same comprising a suitable holder for the translating device, a reaction or counter electro-motive force coil attached to and forming part of said holder, and wound in sections varying in their electrical resistance, electrical connections between the said coil and the translating device, whereby when said device is put into operation the coil will become active, and means for successively rendering the sections of the coil active or inactive.

12. A socket or holder for incandescent electric lamps and other translating devices supplied with alternating or intermittent currents, the same comprising a suitable holder for the translating device, a reaction or counter electro-motive force coil attached to and forming part of said holder, circuit connections, substantially such as described, between the coil and the translating device, and an adjustable core for varying the amount of electro-motive force generated by the coil.

13. In a regulating socket or holder for incandescent electric lamps and other translating devices, the combination with the lamp holding device, of a movable coil to which the holding device is attached, a core designed and adapted to enter the coil, and means, substantially such as described, for holding the coil and core in any desired position with relation to each other in which the same may be placed.

14. In a regulating socket for incandescent electric lamps and other translating devices, the combination, with the circuit-wires and the translating device, of a solenoid or coil to which the translating device is attached, a stationary laminated iron core over which the coil is adapted to move, and means, substantially such as set forth, for maintaining electrical connection between the movable coil and the circuit wires.

15. In a regulating socket for incandescent electric lamps, the combination, with the circuit wires and the stationary supporting fixture, of a magnetizable core secured to said fixture, a self inductive solenoid [or reaction coil] arranged to be moved over said core, a lamp attachment or holder secured to said solenoid and having one of its terminals electrically connected therewith, and electrical connections between the solenoid and other lamp terminal and the circuit-wires, substantially as set forth.

16. In a regulating apparatus for translating devices operated by alternating or intermittent currents, the combination, with the circuit-wires, of a divided laminated core having its divided portions electrically insulated from each other and connected with said circuit-wires, a counter electro-motive force coil or solenoid surrounding said core and arranged to traverse or to be traversed by the same, and contact making brushes or detents secured to the coil or its support and adapted to make electrical connection between the coil and its conducting core.

17. In a regulating apparatus for translating devices operated by alternating or intermittent currents, the combination with a coil or coils in the circuit of the translating device, of a longitudinally electrically divided magnetic core for the coil or coils, permanently connected with the leading wires and in sliding contact with the terminals of the coil or coils, substantially as described.

18. In a regulating apparatus for translating devices operated by alternating or intermittent currents, the combination with a coil or coils in the circuit of the translating device, of a longitudinally divided magnetic core having an insulating partition and an insulating slotted sheath; a permanent connection between the leading wires and the divisions of the core, and contacts at the terminals of the coil or coils entering the slots and bearing upon the core section, substantially as described.

19. In a regulating socket for translating devices operated by alternating or intermittent currents, the combination, with the circuit-wires and the translating device, of a counter electro-motive force coil forming part of said socket and connected in series with the translating device, a shunt or short circuiting connection of low resistance around said coil, and a core movable with respect to the coil and arranged to short circuit the latter when withdrawn, substantially as set forth.

20. In a regulating socket for translating devices operated by alternating or intermittent currents the combination, with the circuit wires and the translating device, of a counter electro-motive force coil forming part of said socket and normally in series with said translating device, a core movable with respect to the coil and adapted to vary the amount of counter electro-motive force generated by it, and means, substantially such as set forth, for opening the circuit through the coil and translating device when the relation between the coil and core is such that the latter is fully within the coil, substantially as set forth.

21. In an electric lamp socket, the combination of the lamp holding terminals C, D, the counter electro-motive force coil or solenoid F, and the inclosing shell *g*, substantially as set forth.

22. In an electric lamp socket, the combination of the lamp holding terminals, the counter electro-motive force coil, the laminated core I and the inclosing shell *g*, substantially as set forth.

23. In a regulating socket for incandescent electric lamps provided with a reaction coil and core movable with reference to each other, an insulating coupling between the core and the socket support or fixture, formed with a central channel for the admission of the leading wires, and with lateral openings for the exit of said wires, substantially as described.

24. In a regulating socket for incandescent electric lamps the combination with a reaction coil and laminated core movable with reference to each other, of notches in the core and detents fixed to the coil and engaging the notches, whereby the coil and core are locked in their adjusted relative positions, substantially as described.

25. In an electric lamp socket, the combination with a reaction coil and longitudinally electrically divided magnetic core permanently connected with the leading wires and formed with notches along its sides; of spring detents bearing upon the core sections and adapted to engage the notches, and electric connections between the detents and terminals of the coil, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELIAS E. RIES.

Witnesses:
LEOPOLD RIES,
JNO. T. MADDOX.