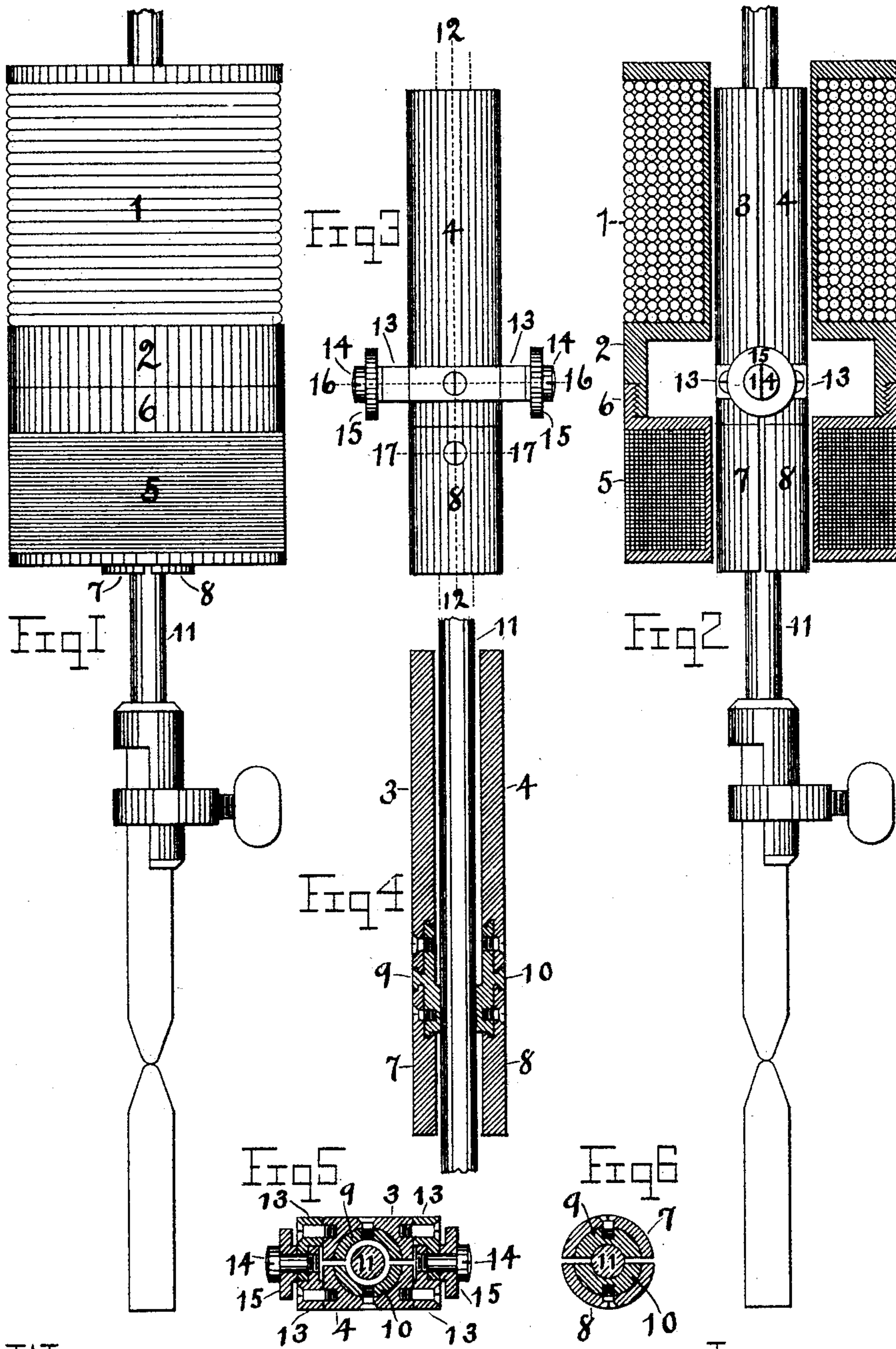


(No Model.)

J. C. WRAY.
ARC ELECTRIC LAMP.

No. 497,438.

Patented May 16, 1893.



WITNESSES

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ARC ELECTRIC LAMP.

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Application filed March 21, 1892. Serial No. 425,876. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. WRAY, residing at Peoria, in the county of Peoria and State of Illinois, have invented a new and useful Regulator for Arc Electric Lamps, of which the following is a full, clear, and exact description, such as will enable any skilled person to construct the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the regulator (arc forming and carbon feeding mechanism) of an arc electric lamp.

My invention consists in the peculiar construction and disposition of the cores of the series and shunt coils hereinafter described.

In my lamp, I use a form of solenoid or magnet core which is divided longitudinally or in a direction similar to that of the lines of magnetic force (perpendicular to the direction of the current in the surrounding coil) said divisions or sections being so disposed that they may oscillate to and from each other. When such a form of core is magnetized, by the passage of the electric current in a surrounding coil, the divisions or sections thereof, will repel each other, on account of their similar magnetic polarity. The peculiar advantages of the herein described regulator are due to the fact that the cores of the series and shunt coils are so disposed that the force of magnetic repulsion, between the divisions or sections of the core of the series coil, tends to retard or prevent the movement of the carbons or electrodes, while the force of magnetic repulsion, between the divisions or sections of the core of the shunt coil, causes and controls the feeding of the carbons or electrodes, as described in the following specification and illustrated in the accompanying drawings which will be referred to by numerals, similar parts in all the figures being numbered alike.

Figure 1 is a general view of the mechanism. Fig. 2 is a vertical section of Fig. 1. Fig. 3 is a side view of the cores. Fig. 4 is a longitudinal section of Fig. 3, taken on the line 12—12. Fig. 5 is a sectional view of Fig. 3, taken on the line 16—16, in Figs. 2 and 3. Fig. 6 is a sectional view of Fig. 3, taken on the line 17—17.

Referring to Figs. 1 and 2, 1 is a series solenoid, wound on the spool 2, surrounding the main core, which consists of the sections 3 and

4; 5 is a shunt or regulating coil, wound on the spool 6, surrounding the regulating core, which consists of the sections 7 and 8.

Fig. 3 is a side view of the cores.

Fig. 4 is a longitudinal section of Fig. 3, taken on the line 12—12, showing the gripping jaws 9 and 10, which engage with the carbon rod 11. The section 3, of the main core, and the section 7, of the regulating core, are rigidly attached to the gripping jaw 9; the section 4, of the main core, and the section 8 of the regulating core, are rigidly attached to the gripping jaw 10, as shown in Fig. 4. The lugs 13 are attached to the sections of the main core 3 and 4 and, together with the screws 14, form the bearings, by means of which, the resultant movements, between the sections of the main and regulating cores, disposed as shown, are transmitted to the gripping jaws 9 and 10.

15 are stop wheels, carried by the screws 14, which limit the longitudinal movement of the cores. It is obvious that the longitudinal movement of the cores, or the distance which the solenoid 1 can lift them, will be equal to the distance which the stop wheels 15 can travel, between the spools 2 and 6, Fig. 2.

18 and 19 are hardened plates, attached to the spools 2 and 6, to prevent the wearing of said spools by the stop wheels 15.

When the lamp is idle, the cores and gripping jaws, assembled as described, rest by means of the stop wheels 15, on the spool 6, the carbons or electrodes being in contact, Fig. 2.

When the electric current passes through the lamp, the solenoid 1 magnetizes the main core, which consists of the sections 3 and 4, which, being in movable relation to each other as shown, Figs. 2 and 4, repel each other, on account of their similar magnetic polarity, and cause the gripping jaws 9 and 10 to grasp the carbon rod 11. Simultaneous with the above described movements, the cores are drawn upward by the solenoid 1, until the stop wheels 15 come in contact with the spool 2, thereby separating the carbons or electrodes and forming the electric arc. When the arc is formed, a certain portion of the current will pass through the shunt or regulating coil 5, which is connected as a shunt of the arc, magnetizing the regulating core, which consists of the sections 7 and 8, which are in movable relation to each other as shown in Figs. 2 and

4, causing a certain amount of repulsion between the sections of said regulating core on account of their similar magnetic polarity. Said regulating coil is so proportioned in relation to said regulating core as to effect no magnetic attraction for it, the sole function of said regulating coil being to magnetize said regulating core. The force of repulsion, between the sections of the main core 3 and 4, will be constant on account of the unvarying amount of current passing through the solenoid 1, while the force of repulsion, between the sections of the regulating core 7 and 8, will vary on account of the varying amount of current passing through the regulating coil 5. The current passing through said regulating coil, will vary in direct proportion to the resistance of the arc; therefore the force of repulsion between the sections of the regulating core 7 and 8, will increase when the resistance of the arc increases. The unvarying force of repulsion, between the sections of the main core 3 and 4, tends to keep the gripping jaws 9 and 10 in contact with the carbon rod 11, while the varying force of repulsion, between the sections of the regulating core 7 and 8, tends to separate said gripping jaws and release the carbon rod 11.

As the carbons or electrodes are consumed, the arc increases in length and in electrical resistance, thereby causing the amount of current passing through the shunt or regulating coil 5, and consequently the force of repulsion between the sections of the regulating core 7 and 8, to increase proportionately. When the resistance of the arc has increased to a certain extent, the force of repulsion, between the sections of the regulating core 7 and 8, will overcome the force of repulsion, between the sections of the main core 3 and 4, thereby separating the gripping jaws 9 and 10 and allowing the carbon rod 11 to descend, shortening the arc and decreasing its electrical resistance. Upon a certain decrease in the resistance of the arc, the amount of current passing through the shunt or regulating coil 5, and consequently the force of repulsion between the sections of the regulating core 7 and 8, will be lessened to such an extent as to allow the force of repulsion, between the sections of the main core 3 and 4, to again preponderate and cause the gripping jaws 9 and 10 to grasp the carbon rod 11, thereby preventing its farther downward movement until the resistance of the arc has again increased to such an extent as to cause a repetition of the feeding movements as described.

Although advantageous, it is non-essential that the solenoid 1 and the main core should form the arc, as described, as the sectional cores may be used solely for the purpose of effecting the feeding and adjustment of the carbons or electrodes, the arc being formed by a solenoid or magnet provided for the purpose.

While but one series coil and one shunt

coil, with their respective sectional cores, are used in the herein described regulator, it is obvious that two or more series coils and two or more shunt coils, having cores substantially as described, can be combined with a suitable clutch should special requirements render it necessary.

It is obvious that the form of the cores and gripping jaws and minor parts of the regulator can be greatly varied without changing the principle of operation. Therefore I do not confine myself to any specified form in constructing the regulator, so long as any requisite or suitable number of series and shunt coils, having sectional cores substantially as described, are so disposed, in combination with a suitable gripping device or clutch, that the force of magnetic repulsion between the divisions or sections of the core or cores of the series coil or coils tends to prevent or retard the movement of the carbons or electrodes, while the force of magnetic repulsion between the divisions or sections of the core or cores of the shunt coil or coils controls or effects the feeding of the carbons or electrodes.

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

1. The combination, in an arc electric lamp, of a solenoid 1 in the main circuit, having a core consisting of the sections 3 and 4, and a shunt or regulating coil 5 connected as a shunt of the arc, having a core consisting of the sections 7 and 8, said cores and the gripping jaws 9 and 10, assembled as described, operating in the manner, and for the purpose set forth.

2. The combination, in an arc electric lamp, of a main coil 1, wound on a spool 2, having a core consisting of two longitudinal sections 3 and 4; a shunt coil 5, wound on a spool 6, having a core consisting of two longitudinal sections 7 and 8; gripping jaws 9 and 10; lugs 13 and pivot screws 14, and carbon rod 11, substantially as described.

3. The combination, in an arc electric lamp, of a coil, in the main circuit, having a core consisting of two longitudinal sections, in movable relation to each other; a coil, connected as a shunt of the arc, having a core consisting of two longitudinal sections, in movable relation to each other, and any suitable form of clutch, the functions of said cores being the same as set forth in the foregoing specification.

4. Any construction of an arc electric lamp, in which the main and shunt coils are each provided with a core, consisting of two longitudinal sections, in movable relation to each other, the functions of said cores being the same as set forth in the foregoing specification.

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Witnesses:

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