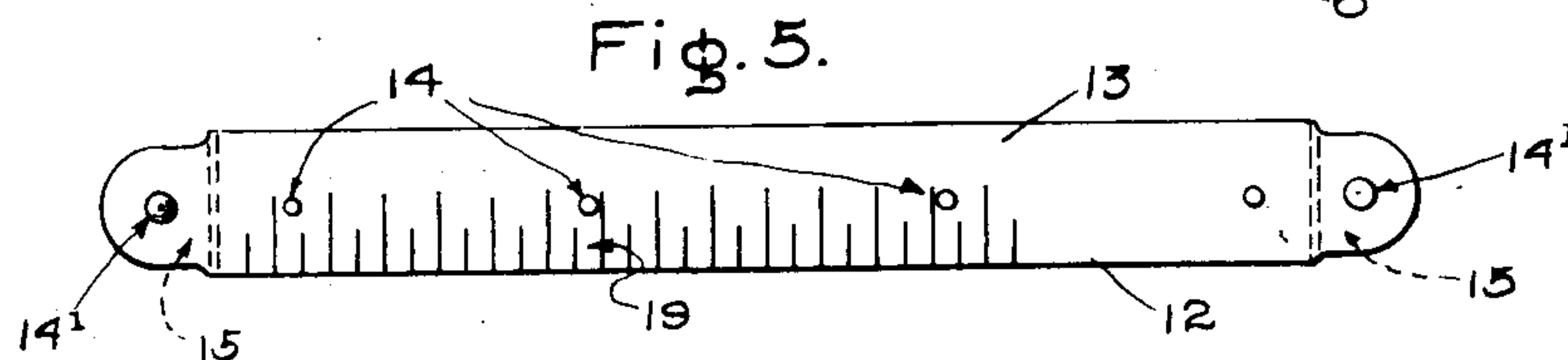
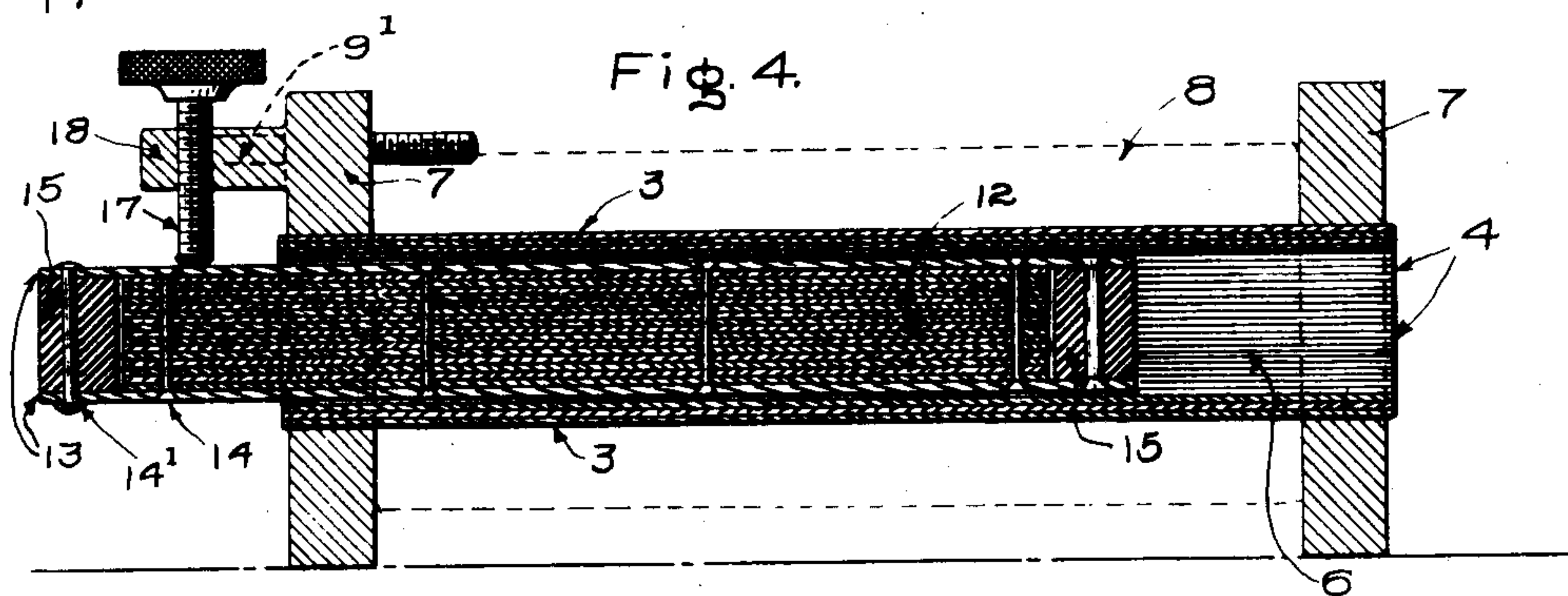
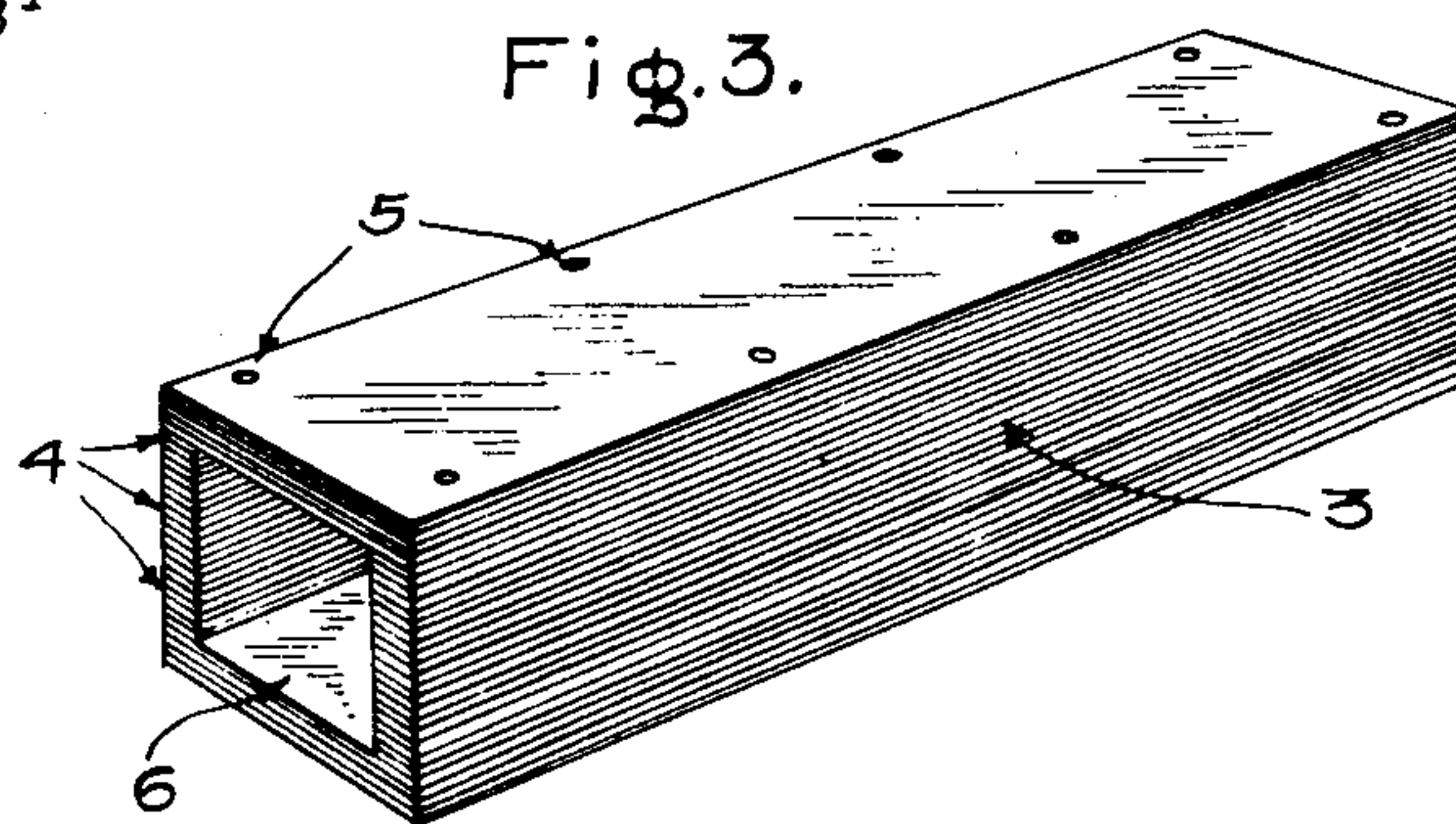
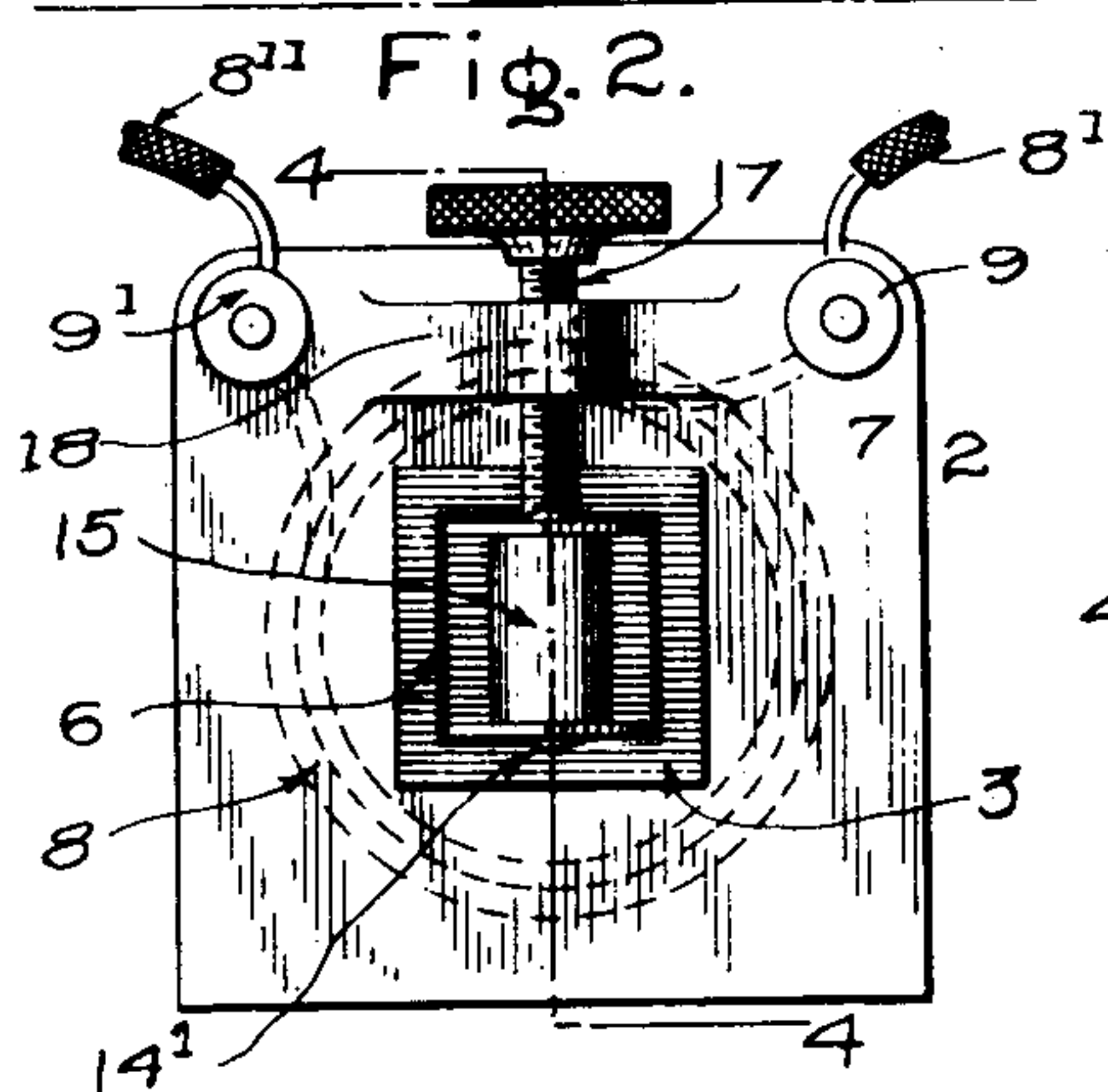
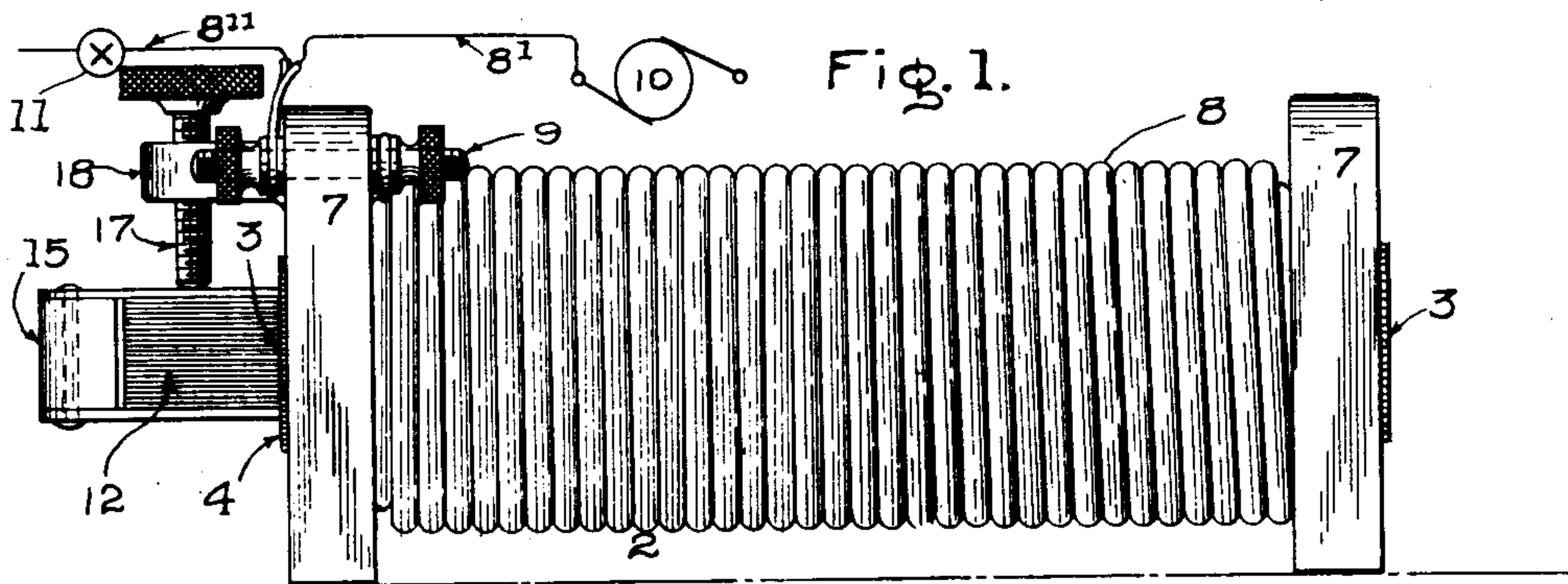


No. 869,684.

PATENTED OCT. 29, 1907.

A. H. BARBER.
ELECTRIC REGULATOR.
APPLICATION FILED MAR. 27, 1907.



Witnesses:
M. G. Crozier.
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Inventor,
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Att'y

UNITED STATES PATENT OFFICE.

ALBERT H. BARBER, OF WATERTOWN, NEW YORK, ASSIGNOR OF ONE-HALF TO JAY M. MULLEN, OF WATERTOWN, NEW YORK.

ELECTRIC REGULATOR.

No. 869,684.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed March 27, 1907. Serial No. 364,770.

To all whom it may concern:

Be it known that I, ALBERT H. BARBER, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Electric Regulators, of which the following is a specification.

This invention relates to improvements in electric regulators, designed for use in connection with alternating electric currents, and the invention relates particularly to a device for regulating the current of arc-lamps employed in connection with motion picture machines.

The object of this invention is to provide a regulator of the class, which is simple, effective and inexpensive, and whereby the light of an arc-lamp may be increased or raised and maintained at a bright glow, or dimmed or decreased, without affecting or changing the flow of current in the circuit from the generator to the device.

A further object of the invention is to provide a regulator of the class, by the use of which a steady and bright light may be produced and maintained in an alternating current lamp, whether the current supplied by the generator is of the maximum or lower potential.

A further object of the invention is to provide a regulator of the class which will produce a light of suitable brightness or strength without any waste of current, by reason of the heating usually attending the employment of resistance coils, thereby effecting a great saving, or reduction in the amount of alternating-current used in connection with arc or other alternating-current lights. And a further object of the invention is to provide a regulator for employment in connection with moving picture machines, or other devices or systems, for the purpose of lessening the cost of electric current consumed by the arc-lamps used in the operation of such machines.

The invention consists principally in providing a coil forming a part of an alternating-current circuit and disposing the same in series with an arc-lamp. The said coil being wound upon a laminated spool or bobbin having a central opening therethrough, and a laminated core adjustably fitting the opening in the spool. The said laminæ or layers of the spool and core consisting of thin strips or sheets of soft iron or steel having insulation between the layers. And the laminated parts of the spool and core each having substantially the same amount of iron by weight. And the invention further consists in providing means for adjusting and holding the movable core in different positions in relation to the coil.

Other features and parts of the invention will be fully understood from the detail description which follows, and by reference to the accompanying drawings forming a part of this specification, and in which—

Figure 1 is a side elevation of the complete regulator, showing same connected with a source of electric energy and an arc-lamp; also showing the adjustable core partly withdrawn from the coil. Fig. 2 is a front-end elevation, showing the wire terminals and the adjustable parts in full lines; also showing the position of the coil in dotted lines. Fig. 3 is a perspective view, showing the manner of constructing the square laminated spool-body. Fig. 4 is a vertical longitudinal section substantially on the line 4—4 of Fig. 2, showing the manner of constructing and arranging the spool and the core, the coil being omitted. Fig. 5 is a plan view of the adjustable core, showing graduations for use in setting the same.

Similar numerals of reference are assigned to corresponding parts throughout the several views.

In the drawings, 2 represents my regulator complete.

3 represents a laminated spool-body, preferably built up in square form, as shown, of thin strips or layers of soft iron or steel 4, of suitable gage, each of the said layers or strips being separated from the others by a suitable insulating material, and the laminæ or layers being bound or held together by a series of rivets or bolts 5.

6 represents a square central opening or hole which extends lengthwise through the spool 3, and 7, 7 designate square fiber or rubber head-pieces, each having a square central opening into which the ends of the spool-body are tightly fitted. Upon the spool thus described is coiled a wire 8, substantially in the same manner shown in Figs. 1 and 2. Two layers of wire 8 are shown coiled on the spool, but a greater, or a less number of windings may be employed if desired. The wire 8 preferably consists of a heavy gage of copper suitably insulated to withstand a heavy alternating-current such as employed for arc-lamps and the like. To facilitate connecting the ends of wire 8 with the spool and also making a series connection with the main line of the circuit comprised of the wires 8' and 8'', I provide binding-posts 9 and 9', which are suitably secured to one of the fiber ends of the spool. The binding-posts are preferably double—each post having a binding-nut on the inner as well as on the outer face of the fiber head.

10 represents a generator, dynamo or other source of electrical energy, which connects directly with one pole of the coil, and 11 represents an arc-lamp preferably of the type known as hand-feed arc-lamps such as

employed for operating motion picture machines, which is connected with the opposite pole of the coil. Under the construction thus far described the alternating-current will flow from the generator 10, through line 8' to binding-post 9, thence around the spool by passing through wire 8, thence through binding-post 9' and line 8'' to the arc-lamp 11. After these connections are made as described, there will be an unbroken circuit from the dynamo or transformer to the lamp, the same as if the coil was omitted and the lines 8' and 8'' were joined together.

12 represents a square laminated core, preferably made of soft iron of the same quality and weight as the spool-body, and of such size that it will operably fit the square hole in the body, as shown. The top and bottom layers or plates 13 of the core, are preferably made of strips of metal of heavier gage than the intermediate layers, so as to stiffen the core. Between the laminæ of the core any suitable insulating material may be disposed. The layers of the core are bound together with rivets 14, and between the ends of plates 13, which project beyond the other layers of the core, are disposed fiber or rubber handles 15, secured by bolts 14', for preventing a person handling the core from receiving static shocks. The magnetic pull exerted upon the core while the current is acting upon the coil is quite strong, and in order to hold the core in place when adjusted to different positions in the coil, a set-screw 17 is provided, and the same is mounted in a lug or bracket 18, which is suitably secured to the fiber head-piece 7.

19 represents a series of graduations or a scale formed upon the upper side of the core 12, to enable the operator to set the core in a number of measured positions, or to set it in the same position repeatedly if desired.

The laminated iron of the core is employed to prevent the formation of dangerous eddy or Foucault currents in the coil which are liable to heat the same to an extent sufficient to burn the insulation of the wires comprising the coil. Cores of this kind have heretofore been used in electrical devices of various kinds, and the construction therefore is common. I am not aware, however, that laminated spools or bobbins have been used in connection with laminated cores in coils of the class described herein.

The laminated spool is employed for the purpose of avoiding eddy currents in that portion of the coil from which the core has been either partially or wholly withdrawn, while the current is flowing in the main circuit of which the coil forms a part, or during a lighting period. It has been found that the best results are obtained from my device employed with arc-lamps of the class described, when the spool-body contains approximately the same amount by weight of the thin iron layers as is employed in the core. The reason for this is that, when a considerable amount of iron is left stationary in the coil when the core is withdrawn, it prevents the distorting of the magnetic field, and prevents undue heating of the coil, which would endanger the insulation of the wire and at the same time change the condition of the light, as well as show a greater amount of current consumed than actually required to operate

the arc-light. Under the construction shown and described herein, the coil is kept cool at all times, and the current is so regulated that there is practically no waste, and therefore a great saving in the cost of the current for motion picture machines over the old methods is effected. It is not essential that the iron of the core and spool should be exactly equal in weight or bulk, because a slight difference in the proportions of the metal would not hinder the device from doing good work. But by leaving twelve to fifteen pounds, or about one-half of the whole amount of iron in the coil at all times, it is impossible for dangerous currents to form, or other loss or damage to result, as explained.

So far as I am aware, only hand-feed arc-lamps are employed for moving picture machines, and in order to regulate and control, as well as to lessen the cost of the current used in their operation, I have devised a regulator as shown and described, wherein the coil is wound upon a stationary spool, oblong in form, having a considerable amount of iron, preferably in laminated form, in addition to a movable iron core, which must be inserted its full length in the spool at the time the current is turned on the lamp circuit and before the arc is struck, and which may afterwards be withdrawn either partially or wholly to increase or regulate the light. If the amount of iron in the spool were considerably less than described the heating of the coil would be more perceptible, the meter would show more current consumed than actually required, thus increasing the cost, which it is an object of my invention to curtail. If the amount of iron in the spool were considerably more than in the core, it would necessitate shifting the core a greater distance to accomplish the same results, and would narrow the range of adjustment of the device.

In devices thus far made and installed in practical use, the spool or bobbin is about twelve inches in length and about four inches square, the central opening 6 measuring about three inches square. The coil 8 preferably consists of Nos. 5 or 6 insulated copper wire. The iron core 12 is a trifle longer than the spool and loosely fits in the opening 6. The laminæ employed in each of the cores and spools weigh about 15 pounds. These proportions have been found to give the best results, where the regulators are employed in connection with the heavy arc-lights.

It is obvious that some changes or modifications may be made in the parts of the device within the scope defined by the appended claims without departing from the spirit of my invention.

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

1. An electric regulator of the class described, comprising a spool having a square oblong laminated body, the said body having a square central hole therethrough, and a square laminated core operably fitting the square central hole in said spool and adapted to be adjusted and held in a number of different positions in relation to said spool, substantially as described.

2. A regulator, comprising a square oblong laminated iron spool or bobbin having a square opening extending centrally throughout its entire length, a square laminated iron core adjustably disposed in said spool or bobbin, the iron of said core being substantially proportioned by

weight to the iron of said spool body, and means for setting and holding said core in a number of measured positions within said spool or bobbin, substantially as described.

- 5 3. A regulator, comprising a coil wound upon a spool having a square laminated iron body provided with a square opening extending lengthwise through its center, a square laminated iron core adjustably fitting said spool, the said core having substantially the same amount of iron

by weight as the body of said spool; and adapted to be 10 shifted and set in a number of different positions in the square opening in said spool, substantially as described.

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

ALBERT H. BARBER.

Witnesses:

EDGAR V. BLOODOUGH,
HARRY DE WALLACE.