

(No Model.)

2 Sheets—Sheet 1.

W. J. DAVY.
ELECTRIC ARC LAMP.

No. 551,029.

Patented Dec. 10, 1895.

FIG. 1.

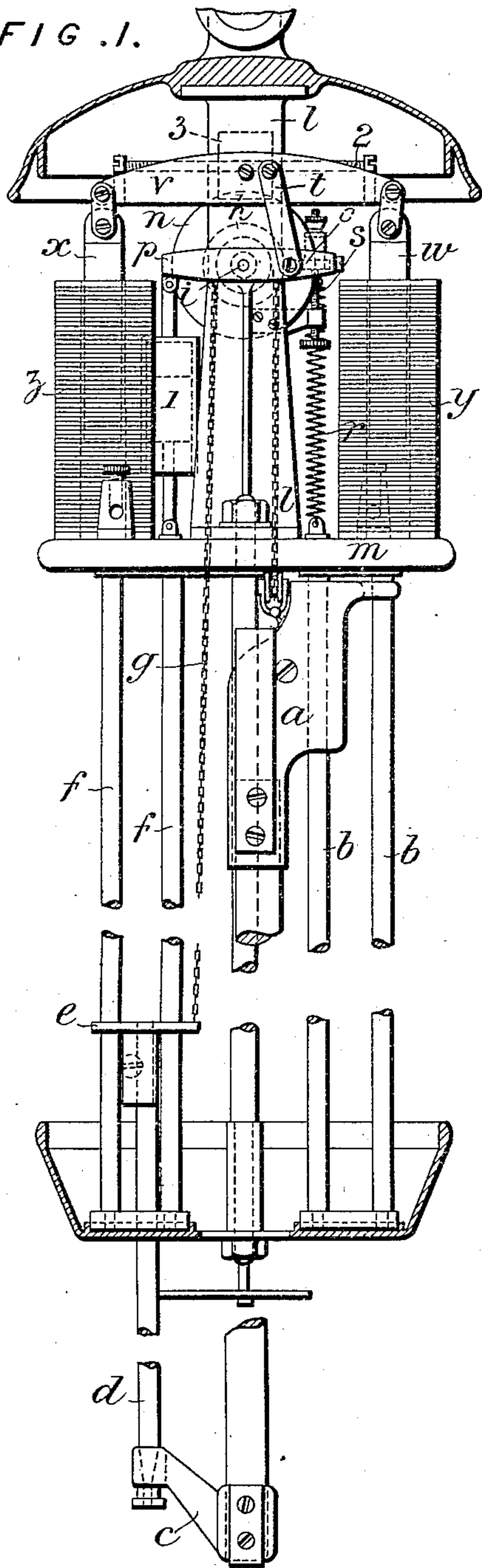


FIG. 2.

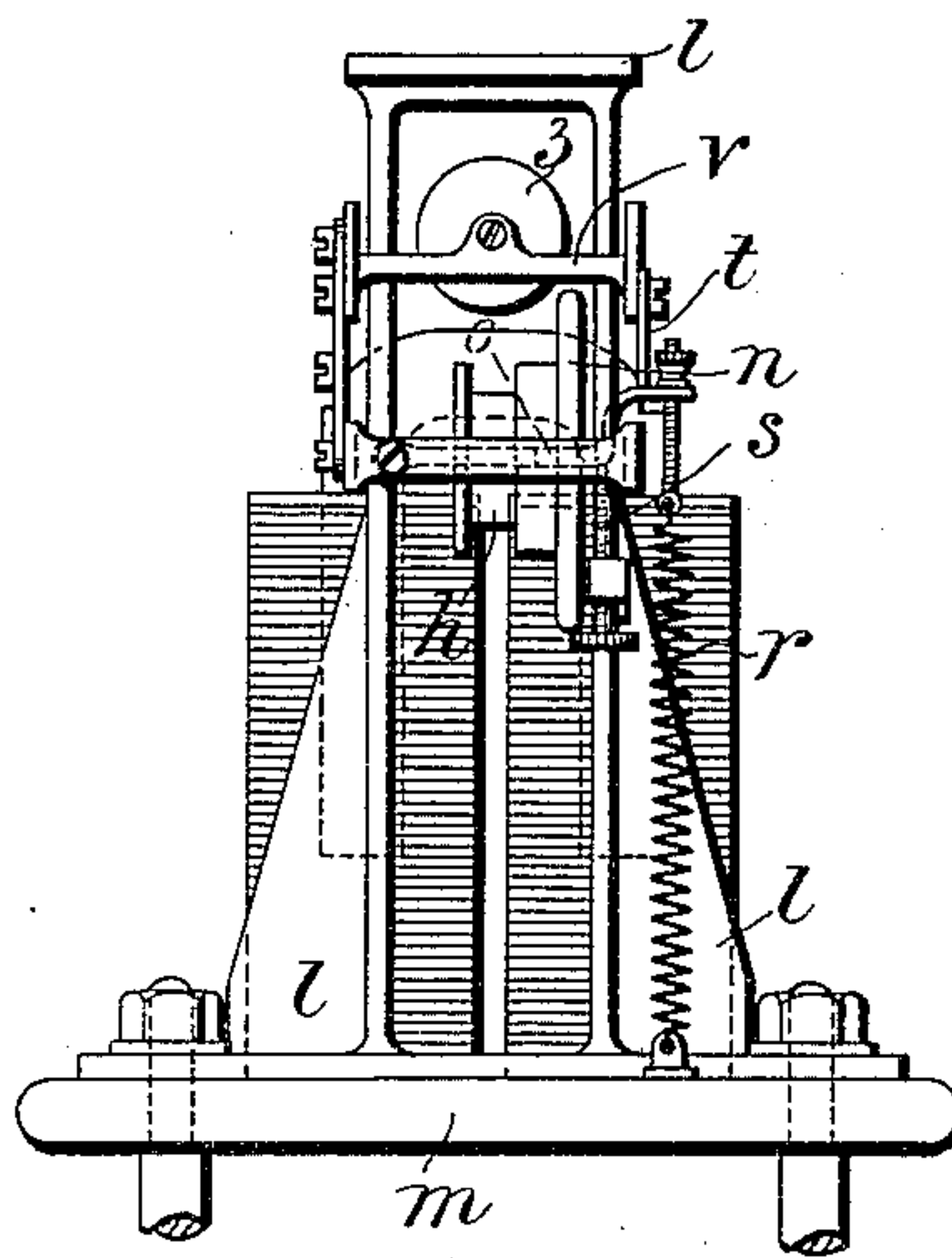
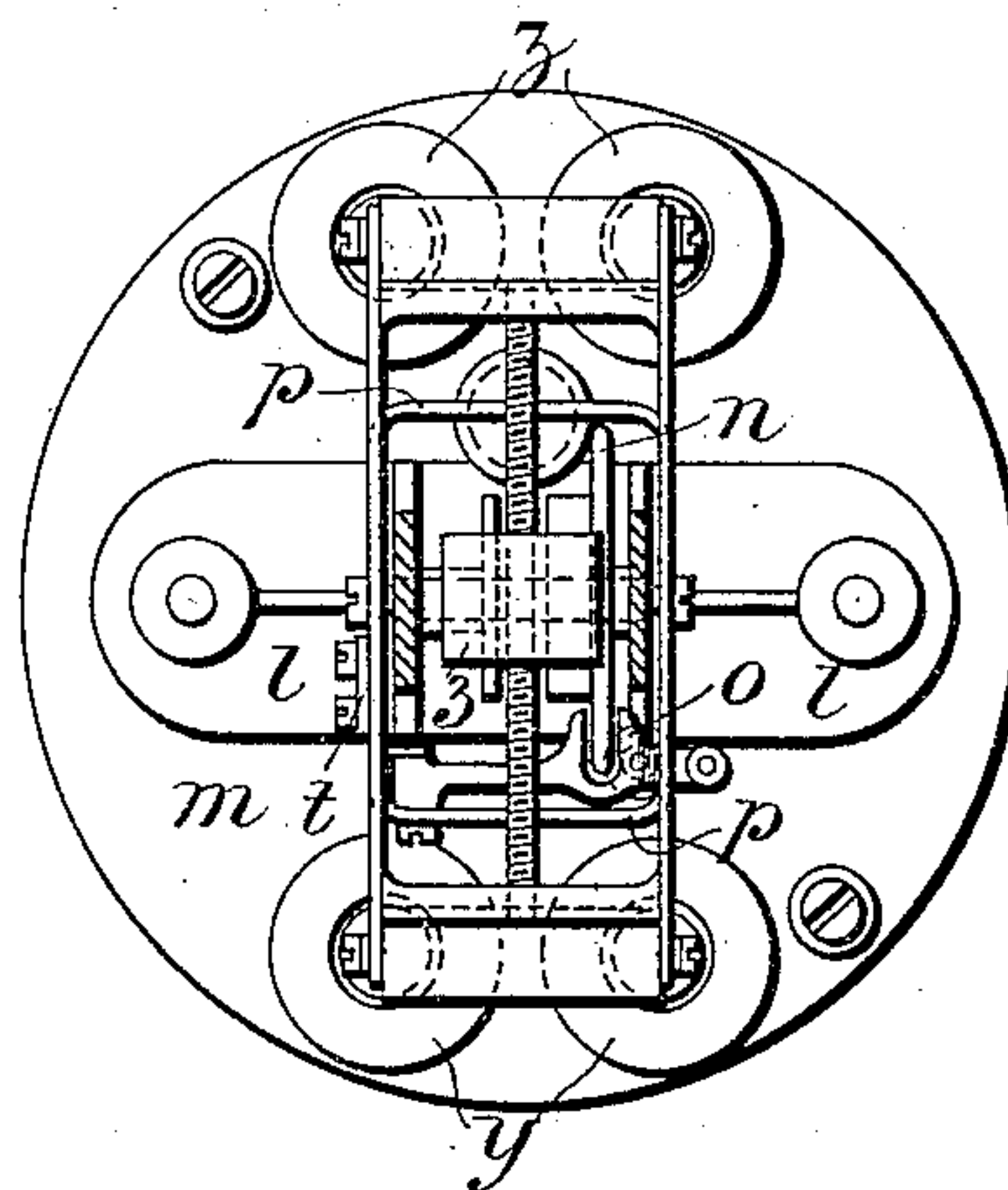


FIG. 3.



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(No Model.)

2 Sheets—Sheet 2.

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FIG. 4.

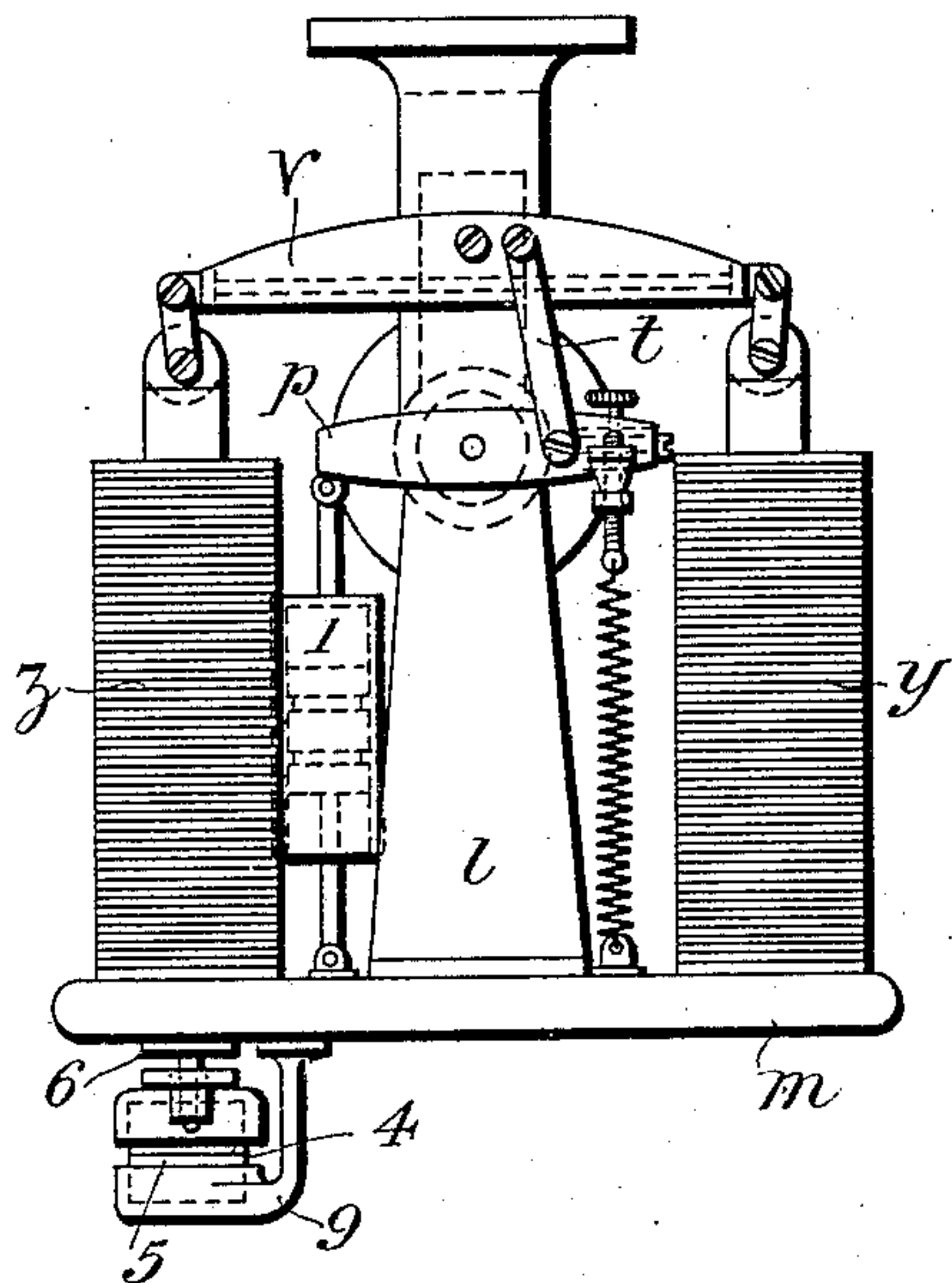


FIG. 5.

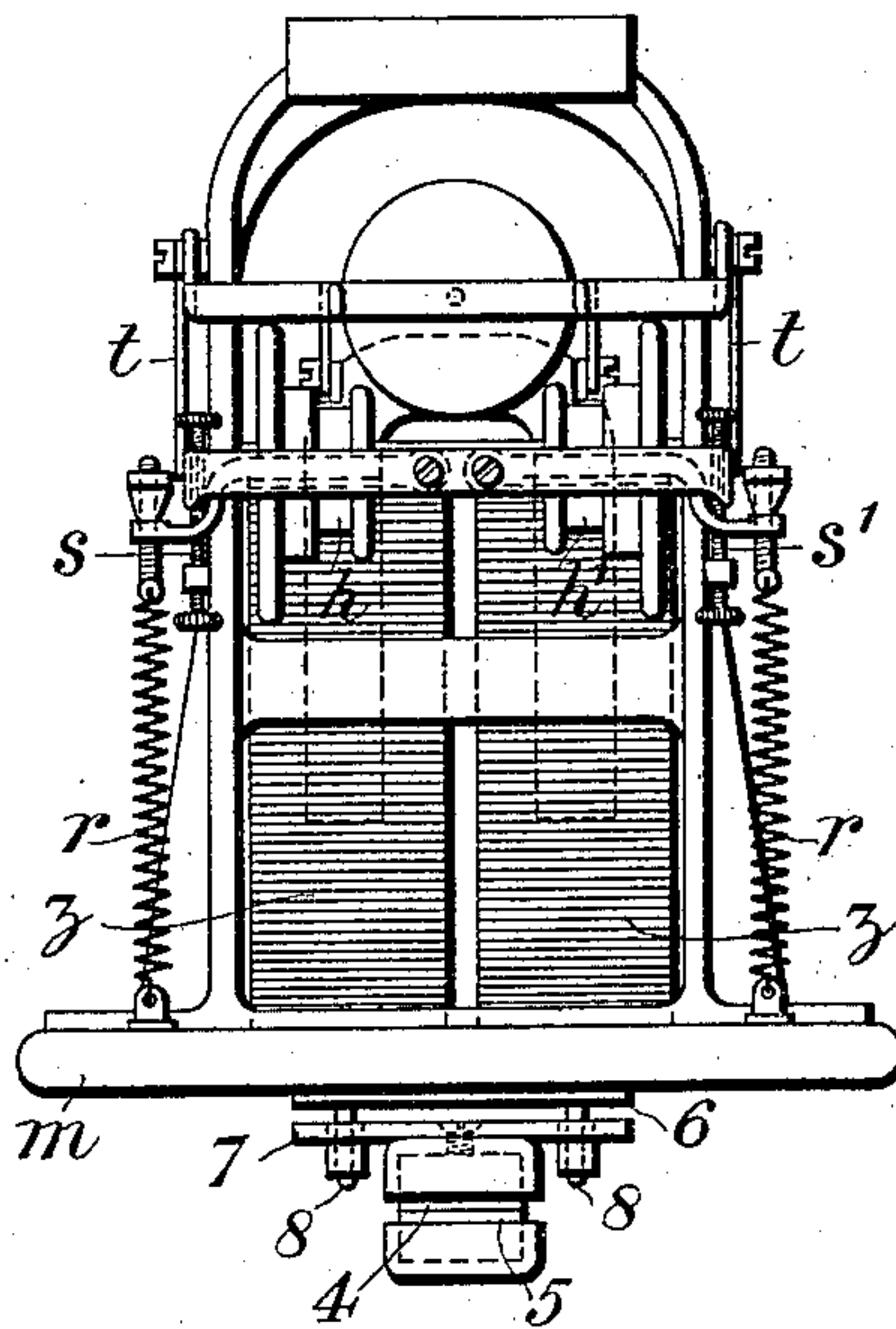


FIG. 7.

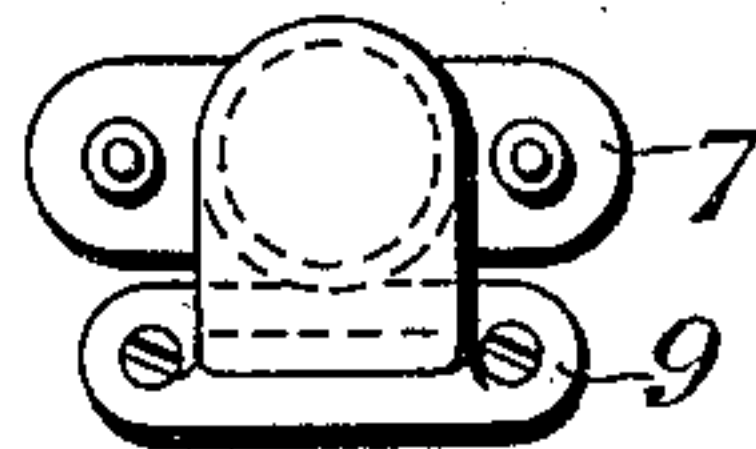
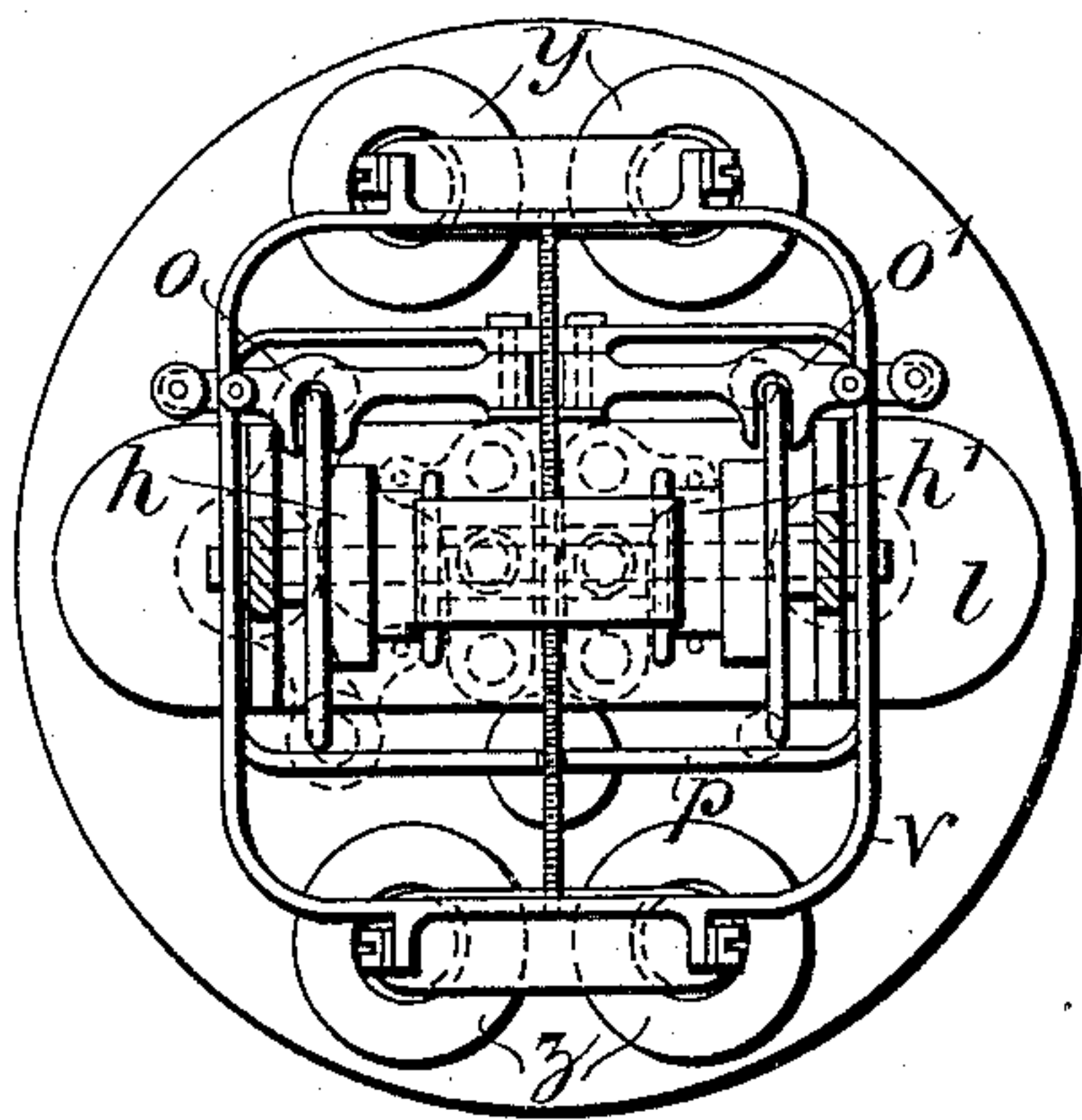


FIG. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM J. DAVY, OF LONDON, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 551,029, dated December 10, 1895.

Application filed April 19, 1895. Serial No. 546,422. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES DAVY, a subject of the Queen of Great Britain and Ireland, residing at Huddleston Road, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Electric-Arc Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention for improvements in electric-arc lamps relates to focusing-lamps, in which the positive and negative carbon holders are connected together by a chain or cord passing over a pulley, and in which the upper-carbon holder tends to descend by gravity, and thus at the same time to draw up the lower-carbon holder so as to bring the two carbons into contact; and it consists in an improved arrangement for striking and maintaining constant the arc and in improved means for adjusting the lamp according to the potential of the circuit in which it is to work.

In an electric-arc lamp constructed according to this invention the carbon-holders are connected together by a chain passing over a pulley and having a deep flange or lip. A nipping-lever having at one end a notch fitting loosely the flange or lip is pivoted at its other end on a spindle mounted parallel to the nipping-edges. Means are provided for determining the position of the lever-pivot according to the resistance of the lamp, the motion being limited by suitable stops. In its normal position when no current is passing through the lamp the nipping-lever rests on a stop, the carbons being in contact. When the current is passed into the lamp, the pivoted end of the lever is raised to cause its notch to grip the flange or lip, and then it is raised bodily to strike the arc. As the arc increases in length the lever is lowered so that the free end comes against its stop, and then as the pivot is further lowered the lever gradually releases the flange or lip and allows the carbons to feed together.

In one form the pulley is loose on its spindle and the nipping-lever is pivoted to a frame, itself pivoted loosely on the spindle of the pulley and connected to a rocking frame,

carrying at its opposite sides the cores of the usual regulating-solenoids. A weight is arranged to slide lengthwise of the rocking frame to regulate the lamp.

A cut-out for the lamp consists of two carbon blocks, one fixed and the other attached to a sliding armature adapted to be operated by the arc-striking solenoid.

In the accompanying two sheets of illustrative drawings, Figure 1 is a front elevation of a single arc lamp constructed according to this invention. Fig. 2 is a side elevation of the upper part of the lamp, and Fig. 3 is a plan of the same. Figs. 4, 5, and 6 are similar views to Figs. 1, 2, and 3, showing the upper part of a duplex lamp, and Fig. 7 is a detail view of a cut-out.

Referring to Figs. 1, 2, and 3, the upper-carbon traveler *a* is guided on the two parallel rods *b*, and the lower-carbon holder *c* is attached to the tail-rod *d*, secured to the traveler *e*, guided on the two parallel rods *f*. The two travelers *a* and *e* are connected together by a chain *g*, passing over the pulley *h*, mounted loosely on the spindle *i*, fixed in the saddle-bracket *l*, secured to the base-disk *m*.

The pulley *h* is provided with a deep flange *n*, and a nipping-lever *o*, formed with a notch or recess in which the flange *n* fits loosely, is pivoted to a small rocking frame *p*, mounted loosely on the spindle *i*. The pivot of the lever *o* is in the horizontal plane of the spindle and at right angles to the spindle—that is, it is parallel to the faces of the flange *n*. The free end of the nipping-lever *o* is weighted or is secured to an adjustable spring *r* and normally rests on an adjustable stop *s*, secured to the bracket *l*.

It will readily be seen that as the pivot of the nipping-lever *o* is raised by rocking the frame *p* on the spindle *i* it first grips the flange *n* and is then raised completely off its stop, thus rotating the pulley *h* and separating the carbons to strike the arc. On lowering the pivot of the lever *o* the pulley is turned to feed the carbons together until the free end of the lever rests on the stop *s*, and any further lowering of the pivot gradually releases the grip on the flange *n* to allow the carbons to feed together at a continuous and exceedingly steady rate, according to the consumption of the carbons.

The small rocking frame *p* is connected by the link *t* to the main rocking frame *v*, mounted on the saddle-bracket *l* and connected to the cores *w x* of the shunt and series solenoid *z y*.

5 A dash-pot 1 may be employed to still further steady the lamp, if necessary.

Mounted longitudinally on the main rocking frame *v* is a screw 2, on which is fitted a weight 3. By operating the screw the weight
10 is traversed along the frame to adjust the lamp.

The operation of the lamp is as follows: On the current passing to the lamp the core *x* of the series solenoid *z* is drawn down and,
15 through the main rocking frame *v*, connecting-link *t*, and small rocking frame *p*, draws up the pivot of the nipping-lever *o* and causes the lever *o* to first grip the flange *n* of the pulley *h* and then rotate it to strike the arc. As
20 the resistance of the arc increases the power of the series solenoid *z* decreases, while that of the shunt solenoid *y*, if one is employed, increases and the nipping-lever is gradually lowered onto its stop *s*, when the lever re-
25 leases its hold on the flange *n*, and a continuous and steady feed is obtained by the flange *n* slipping slowly through the nipping-lever *o*.

The duplex lamp shown in Figs. 4, 5, 6, and 7 is actuated by one striking and regulating
30 mechanism, there being two sets of travelers *a a' e e'* and carbons, two chains and pulleys *h h'*, and two nipping-levers *o o'*, actuated by one set of frames *p v* and solenoids *z y*. The duplicate parts are similar to those described
35 for the single lamp and are indicated, respectively, by the same reference-letters, the second set being indicated by dashes with the letters.

The nipping-levers *o o'* of the two sets of carbons are arranged so that, say, lever *o'*, when the rocking frames *v p* are actuated, leaves its stop *s'* before the other.

The operation of the duplex lamp is as follows: On the current passing to the lamp the
45 rocking frames *p v* raise the nipping-levers *o o'*, and the first, *o'*, to leave its stop *s'* simply separates the corresponding carbons leaving the first pair of carbons—that is, the pair to be first consumed—still in contact. On the
50 further motion of the rocking frames the nipping-lever *o* of the first pair of carbons leaves its stop *s*, separates the points of the carbons, and strikes and maintains the arc. During the time that the first set of carbons are burn-
55 ing the nipping-lever *o'* of the second set of carbons keeps its grip on their pulley *h'* and keeps the points of the carbons apart. When the holders of the first set of carbons come to rest on the framework of the side rods and
60 cannot feed farther together, the rocking frames gradually lower the nipping-levers until the second lever *o'* comes in contact with its stop *s'* and releases the second pulley *h'* of the second set of carbons, which then come
65 in contact and the first set are immediately extinguished. The regulating-frames then again raise the nipping-levers and strike the

are for the second pair of carbons, which continue to burn until completely consumed.

In a similar manner a lamp with three or 70 more pairs of carbons can be operated by a single striking and regulating mechanism.

As shown, the upper or positive carbon is double the size of the lower or negative carbon, so that the focus of the lamp is constant. 75 In alternating-current lamps the carbons may be of the same size.

In order to prevent the chains *g* from slipping on their pulleys *h*, the pulleys are provided with projections fitting in the links of 80 the chains.

A cut-out for the lamp consists, essentially, of two carbon blocks 4 5 normally resting in contact and connected to the terminals of the lamp. The series solenoid *z* is provided with 85 a keeper 6, and its armature 7 is adapted to slide on the rods 8 and carries one carbon block 4. The other carbon block 5 is carried by a small bracket 9 from the disk *m*.

When the current is passed to the lamp, a 90 portion passes through the series solenoid *z*, which attracts its armature 7 and separates the carbon blocks 4 5. On the failure of the lamp the armature 7 and block 4 fall and cut out the lamp from the circuit, the whole cur- 95 rent passing through the carbon blocks 4 5.

What I claim, and desire to secure by Letters Patent, is—

1. In an electric arc lamp in which the carbon holders are connected together by a flexi- 100 ble connection passing over a pulley and in which the carbons tend to approach, the friction grip device consisting of two parallel nipping surfaces moving with the pulley, a nipping lever having a notch fitting loosely 105 on the nipping surfaces and pivoted parallel to the nipping surfaces, a means for determining the position of the lever pivot according to the resistance of the arc and of a stop on which the notched end of the lever rests 110 substantially as described.

2. In an electric arc lamp in which the carbon holders are connected together by a flexi- 115 ble connection passing over a pulley and in which the carbons tend to approach, the friction grip device consisting of a rocking frame mounted on the spindle of the loose cord pulley, of a means for determining the position of one end of the frame according to the resistance of the arc, of a nipping lever hav- 120 ing a notch and pivoted to the frame, two parallel nipping surfaces parallel to the pivot of the nipping lever and moving with the pulley, and of a stop on which the notched end of the lever rests substantially as de- 125 scribed.

3. In an electric arc lamp in which the carbon holders are connected together by a flexi- 130 ble connection passing over a pulley and in which the carbons tend to approach, the friction grip device consisting of a rocking frame mounted on the spindle of the loose cord pulley, of a solenoid core connected to the rocking frame, of a corresponding solenoid

arranged in series, of a nipping lever having a notch and pivoted to the frame in such manner that the lever pivot is raised as the solenoid core is drawn into its coils, two 5 parallel nipping surfaces parallel to the pivot of the nipping lever and moving with the pulley, and of a stop on which the notched end of the lever rests substantially as described.

10 4. In an electric arc lamp in which each pair of carbon holders are connected together by a flexible connection passing over a pulley and in which the carbons tend to approach, a series of friction grip devices one for each 15 pair of carbons and each device consisting of two parallel nipping surfaces moving with the corresponding pulley, a nipping lever having a notch fitting loosely on the nipping surfaces and pivoted parallel to the nipping surfaces, of a stop on which the notched end 20 of the lever rests, and of a single means for determining the positions of the lever pivots according to the resistance of the arc the levers being successively raised off their stops substantially as described. 25

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

WILLIAM J. DAVY.

Witnesses:

J. W. MACKENZIE,
JOHN F. GAIRNS.