T. E. MURRAY.

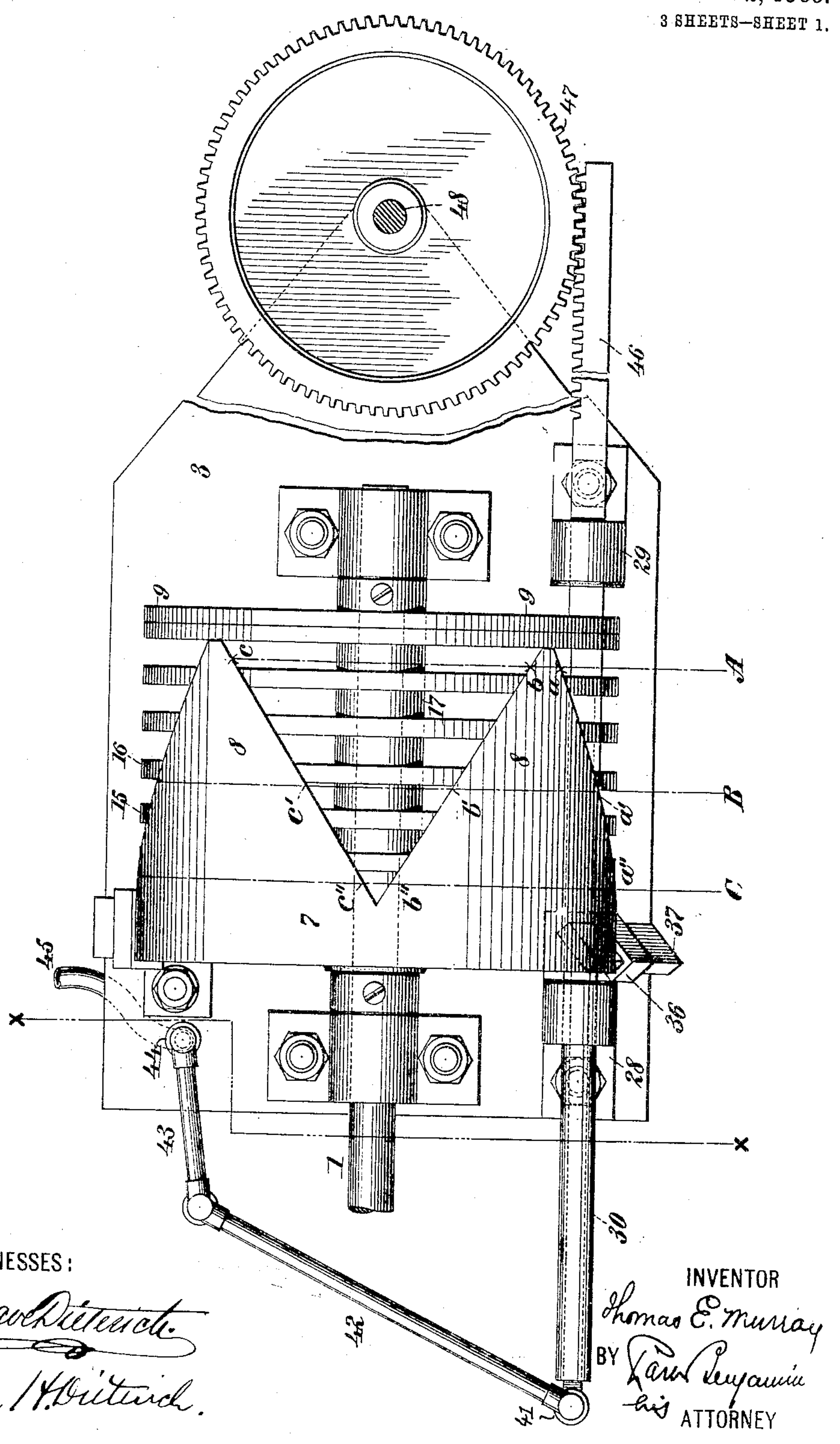
LIGHT REGULATOR FOR ELECTRIC LAMPS.

APPLICATION FILED JAN. 23, 1907.

913,753. Patented Mar. 2, 1909.

3 SHEETS—SHEET 1.

Fig. I.



WITNESSES:

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Fig. 2.

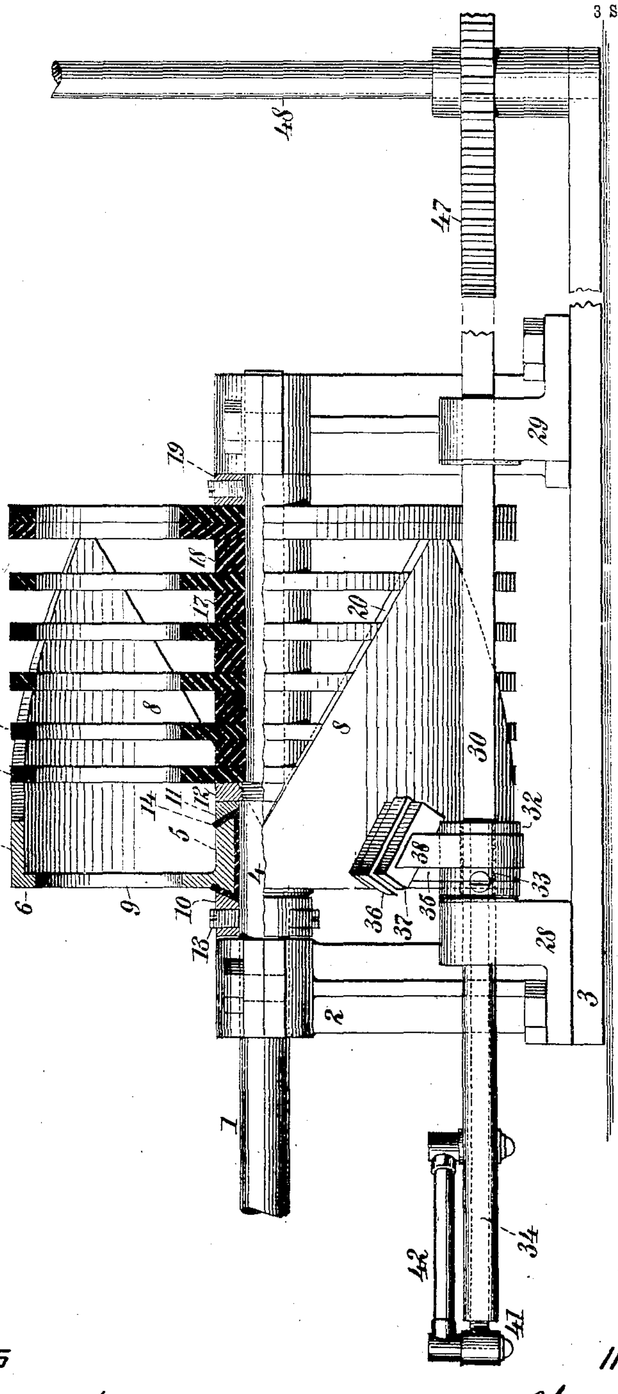

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Fig. 3.

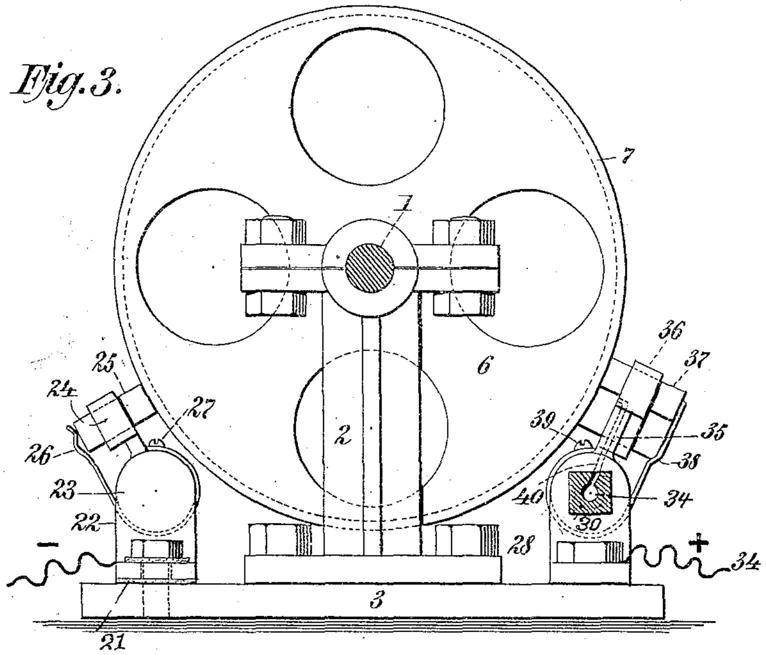
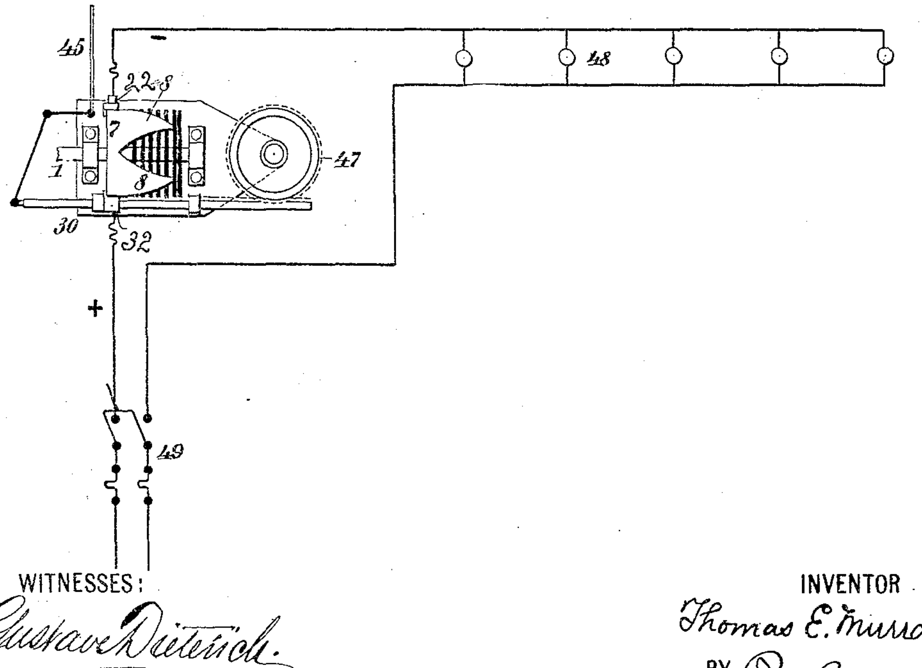


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY, OF NEW YORK, N. Y.

LIGHT-REGULATOR FOR ELECTRIC LAMPS.

No. 913,753. Specification of Letters Patent. Patented March 2, 1909.

Application filed January 23, 1907. Serial No. 353,697.

To all whom it may concern:

Be it known that I, Thomas E. Murray, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Light-Regulators for Electric Lamps, of which the following is a specification.

The invention relates to apparatus for varying the luminous intensity of electric lamps and consists in the construction for preventing overheating of the contact plates, and for extinguishing sparks between said plates and the movable contact, all as more particularly pointed out in the claims.

In the accompanying drawings—Figure 1 is a plan view of my light regulator. Fig. 2 is a side elevation with the parts above the supporting shaft shown in vertical longitudinal section. Fig. 3 is a section on the line *x x* of Fig. 1, and Fig. 4 is a diagram showing my apparatus in circuit with electric glow lamps.

Similar characters of reference indicate like parts.

The shaft 1 which is to be rotated by any suitable means, is mounted in bearings upon standards 2, on the base 3 of the apparatus. Said shaft is enlarged in diameter at 4, and receives upon said enlarged portion the hub 5 of the flanged metal disk 6. The flange 7 of said disk is cut away in V shaped indentations, so as to produce a plurality of similarly shaped projections 8, Fig. 1. The hub 5 is dovetail in cross section, Fig. 2, and is secured upon the shaft by correspondingly faced rings 10, 11. The ring 11 abuts against a threaded ring 12, received upon a threaded portion of the enlargement 4, and the ring 10 is secured upon the enlargement by set screws 13. Between the hub 5 and the shaft and rings, insulating material 14 is interposed. Mounted upon the shaft are apertured disks 15, 16, etc. of insulating material, separated by spacing rings, 17, 18, etc., also of insulating material. Said disks and spacing rings are held between the shoulder formed by the shaft enlargement 4, and threaded ring 12 thereon, on the one side of the series, and a ring 19 secured by a set screw on the other. The disks 15, 16 are of the same diameter as the flanged disk 6, and hence are cut away at their circumferential peripheries to permit the V shaped projections 7, 8, etc. to be seated in them as indicated at 20, Fig. 2. The outer disk 9 may be double.

Bolted to the base 3, but insulated therefrom as shown at 21, Fig. 3, is a bracket 22, having a lateral cylindrical projection 23. Extending angularly upward and outward from said bracket is an arm carrying a metal frame 24, in which fits a carbon contact block 25. One end of said carbon block bears against the continuous circumferential portion of the flange 7 of disk 6, and is held in contact therewith by means of the leaf spring 26. Said spring is secured at its inner extremity by a screw 27 to the cylindrical projection 23 and after passing under and around said projection presses at its outer extremity against the protruding end of carbon block 25.

On the opposite side of base 3 and bolted thereto, as shown in Fig. 2, are brackets 28 and 29, through openings in which passes the rod 30, square in cross section. On said rod is secured by means of a set screw a collar 32, which is insulated from said rod by means of the interposed sleeve 33 of insulating material. From the end of said rod inward and extending through that portion of the rod inclosed by the collar 32 is drilled a bore 34.

Extending upwardly and outwardly from the collar 32 is an arm 35, Fig. 3, carrying a metal frame 36, in which fits a carbon block 37. One end of this block bears against the flange 7 of disk 6, and is held in contact therewith by leaf spring 38 bearing against its outer end. Said spring passes under and around the collar 32 and its extremity is secured by screw 39. Formed in the lower part of the carbon holding frame 36, in the arm 35, in the collar 32, and communicating with the bore 34 of a rod 30 is a duct 40.

Pivoted at 41 to a threaded nipple entering bore 34 is a tube 42, which in turn is pivoted to a tube 43, Fig. 1, and tube 43 is at its end pivoted at 44 to base 3, at which pivoted point there is arranged any suitable means for connecting a hose or other conduit 45 leading to a source of air under pressure. The air current entering the pivoted tubes at 44 will, therefore, pass through said tubes and escape by duct 40 just below the place of contact of carbon block 37 with flange 7 of disk 6. The function of the air blast thus delivered is to blow out any possible electric arc or sparking taking place between the carbon block 37 and the flange

7 of disk 6 under the conditions hereinafter described.

Upon rod 30 are rack teeth 46, which engage with a pinion 47 on the vertical shaft 48. By turning said shaft, the engagement of pinion 47 with rack 46 causes rod 30 to move longitudinally, sliding in brackets 28 and 29 and thus causing the carbon contact block 37 to move along the flange 7 in a direction parallel to the axis of rotation of shaft 1. It will be evident that when the block 37, in moving toward the right of Fig. 2, begins to run off of a flange projection 8 near the apex thereof, it might be unsupported if the circumferential peripheries of the disks 15, 16 did not register with the circumferential periphery of the projections. This, therefore, is the object of making the disks 15, 16 etc. of the same diameter as disk 6, and embedding the flange projections 8 in their circumferential peripheries.

The circuit connections are as follows: The + terminal may be electrically connected to the collar 32 and the − terminal to the bracket 22, as shown in Fig. 4. In the circuit are connected the glow lamps 48 to be controlled, and any form of circuit closer 49. Circuit then proceeds from collar 32 to carbon block 37, and, with the parts as shown in Fig. 2, through the flange 7 of disk 6 to carbon block 25, bracket 22, and so to the lamps.

I will now describe the operation of the device which depends upon the following principle;—first, that the human eye is unable to recognize interruptions in a ray from a luminous focus, if the frequency of said interruptions exceeds a certain rate per second. Second, the luminous intensity of the then apparently unbroken ray can be varied by varying the duration of the interruptions. The resulting physical effect on the eye is that of an unbroken ray which is decreased or increased in luminous intensity, at will. Consider now Fig. 1 and assume the carbon contact to be moved to the right, to the position A, and the shaft 1 to be set in rotation. Circuit will then be completed to the lamps only when the narrow points of the flange projections 8 pass under the carbon contact; or in other words, over a period represented by the transverse width of projection 8 from a to b. Circuit will be broken during the long fraction of the revolution of shaft 1, represented by the distance b, c. The speed of rotation of shaft 1 is, however, to be such that the number of makes and breaks in the circuit to the lamps, or in other words, the number of interruptions of the current in the lamp circuit, is to be greater per second than the eye can appreciate. In practice, it is simply necessary to adjust the carbon block at position A, and regulate the speed of rotation of shaft 1 until the lamps show steady glow. Now let it be supposed that the carbon contact block 37 be moved from position A to position B. The period of contact of the block with each of the several projections 8 may now be equal to the period of non-contact; or in other words, instead of the duration of the interruptions b' c' in the circuit, being much greater than the duration of the closed circuit periods a' b', as was the case in position A; they are now about equal. Conceive the block 37 to be again moved from position B to position C. Here, as is obvious, the duration of the interruptions b'' c'' is much less than the diameter of the circuit periods a'' b''. The consequence will be when the carbon block 37 is at position B, the luminosity of the lamps will be greater than when it is at position A: and greater at position C than when it is at position B, and finally when the carbon block 37 reaches the position shown in Fig. 1, when there is no break caused in the continuity of the circuit, then the luminosity of the lamps will be at a maximum. The gradually tapering shape of the projections 8, for obvious reasons, makes it possible to get any degree of luminosity between minimum and maximum by simply adjusting the carbon block 37 at any desired point; or the lamps can be extinguished altogether by moving it so as to bear only on the outer insulating disk 9.

One practical application of the device, to which by actual experiment I have found it applicable, is the regulation of the intensity of numerous glow lamps simultaneously. Thus in theaters and public halls the lights can be raised or lowered as gradually as may be desired and to any chosen degree, and be held indefinitely at any selected intensity. It will also be noted that the present device entirely obviates the necessity of the introduction in the lamp circuit of resistance coils or other energy-consuming contrivances in order to vary the luminosity of the lamps.

I claim:—

1. The combination of a rotary shaft, a plurality of disks of non-conducting material on said shaft, a plurality of tapered plates of conducting material seated in the circumferential peripheries of said disks, and a contact bearing on said plates and disks and movable in the axial direction of said shaft.

2. The combination of a rotary shaft, a tapered plate of conducting material laterally curved in the arc of a circle having its center in the longitudinal axis of said shaft, means on said shaft for supporting said plate so that an air space intervenes between said plate and said shaft, and a contact bearing on said plate and movable in the axial direction of said shaft.

3. The combination of a rotary shaft, a hollow cylinder of conducting material supported thereon and coaxial therewith, and

provided with indentations at one edge, and a contact bearing on said cylinder and movable in the axial direction of said shaft.

4. The combination of a rotary shaft, a tapered plate of conducting material laterally curved in the arc of a circle having its center in the longitudinal axis of said shaft, ring supports of insulating material for said plate mounted on said shaft, and a contact bearing on said plate and movable in the axial direction of said shaft.

5. The combination of a rotary shaft, a plurality of tapered plates of conducting material supported by and circumferentially surrounding said shaft, a contact bearing on said cylinder, a support for said contact movable in the axial direction of said cylinder, and a series of jointed tubes connecting at one end with a passage in said support leading to the face of said contact.

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

THOMAS E. MURRAY.

Witnesses:

A. R. Storm,

H. F. Lane.