T. E. MURRAY.

LIGHT REGULATOR FOR ELECTRIC LAMPS.

APPLICATION FILED FEB. 11, 1907.

908,117. Patented Dec. 29, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

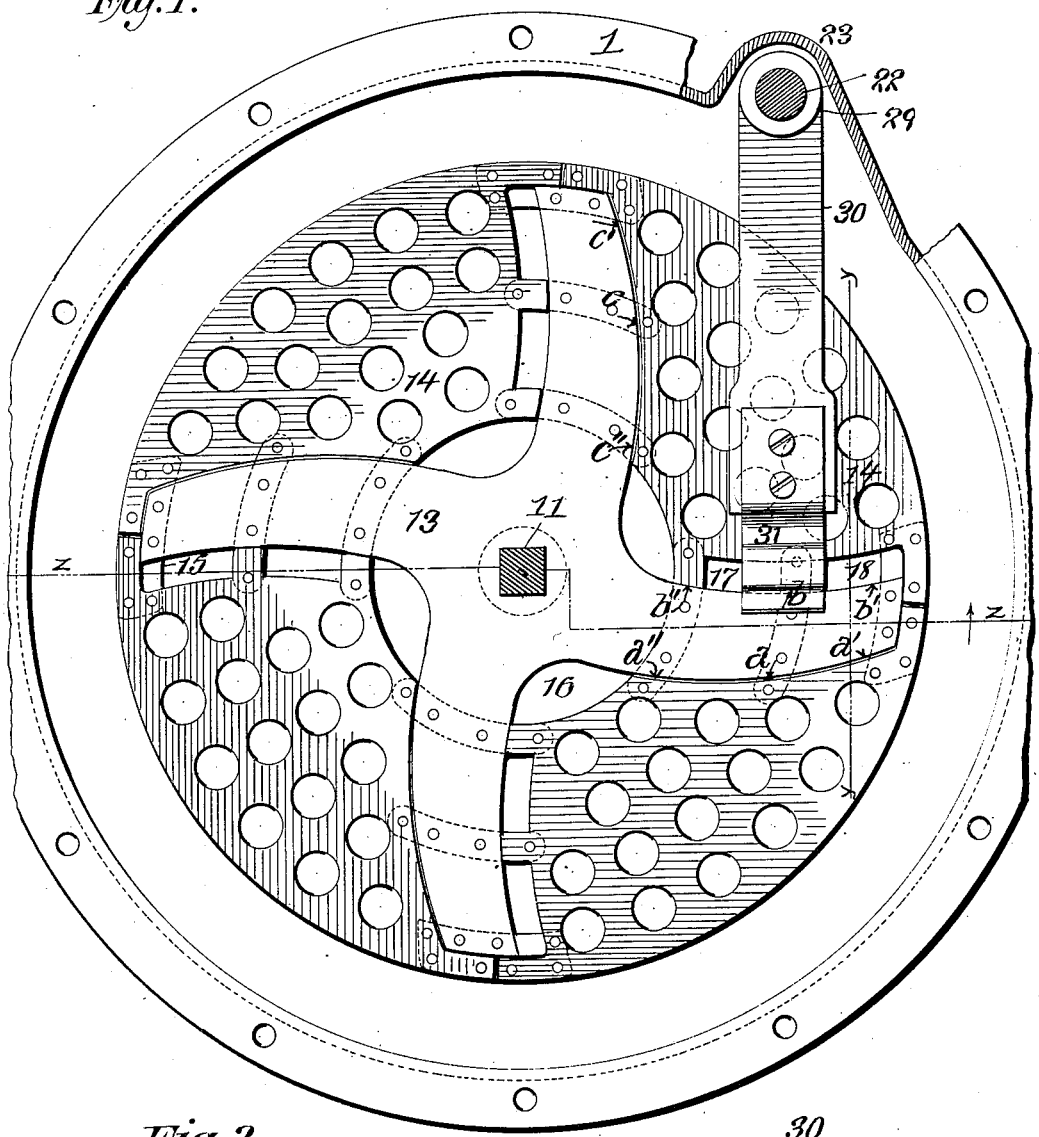

Fig. 2.

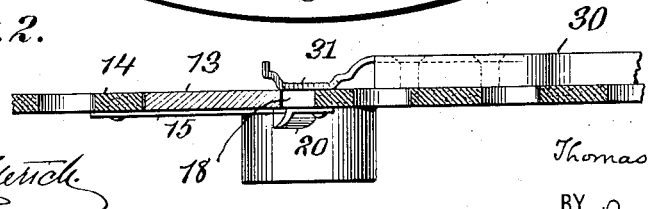

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Fig. 3.

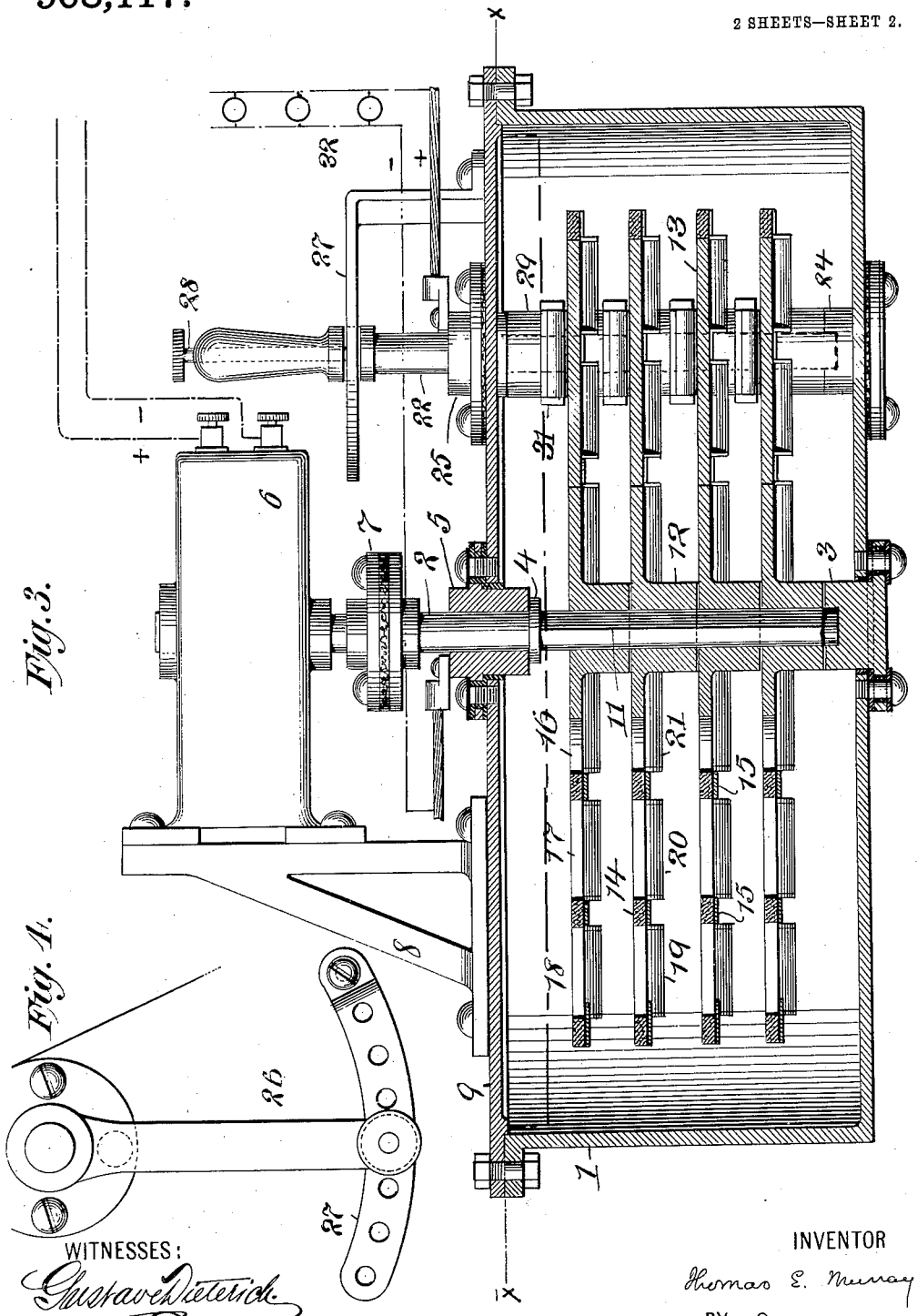

Fig. 4.

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LIGHT-REGULATOR FOR ELECTRIC LAMPS.

No. 908,117. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed February 11, 1907. Serial No. 356,835.

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 is an apparatus for increasing or diminishing the intensity of the light emitted by an electric lamp by producing, in the lamp circuit, current variations of predetermined frequency and varying the relative periodicities of said variations.

The invention consists in the construction of the device and the means for supplying liquid dielectric to the contacts, as more particularly set forth in the claim.

In the accompanying drawings, Figure 1 is a horizontal section of the apparatus on the line *x x* of Fig. 3. Fig. 2 is a section on the line *y y* of Fig. 1. Fig. 3 is a vertical section on the line *z z* of Fig. 1, and Fig. 4 is a plan view of the lever and associated perforated plate.

Similar numbers of reference indicate like parts.

1 is a cylindrical box filled with oil or other liquid dielectric (not shown).

2 is a central shaft having its lower portion disposed in a step 3 insulated from box 1, and provided with the flange 4, above which said shaft passes through the insulated bearing 5 and is connected to the shaft of a motor 6, by the ordinary flanged coupling 7. The motor may be supported by a bracket 8 on the cover plate 9 of box 1. The central shaft 2 within the box is squared at 11, to receive the hubs 12 of the metal contact plates 13, each having a plurality of arms. Between the arms of each contact plate 13 are perforated plates 14 of rubber or other hard insulating material which are supported by the metal strips 15 secured to the under sides of said plates 14 and the under sides of plates 13, in any suitable way. The perforated plates 14 are cut away around the shaft 2 to form a central aperture at 16, and two openings 17, 18, are formed in each plate on one side of each arm of each contact plate 13. On the under sides of the said plates 14 and extending below in front of said openings and also extending radially across the central aperture 16 are buckets 19, 20, 21, having their concavities turned in the same direction, those of the buckets 19, 20, being below openings 17, 18.

22 is a shaft disposed in a projecting portion 23 of box 1, received at its lower end in a step 24 (dotted lines Fig. 3) and passing through an insulated bearing 25 in the cover plate 9. At its upper end said shaft carries a lever 26, which extends over a perforated plate 27 supported in cover 9 and is provided with a vertically movable headed pin 28, which may be inserted in any opening in plate 27. Within the box 1 the shaft 22 carries a series of collars 29, each fast on the shaft and each provided with an arm 30, having at its end a contact spring 31 bent to present a flat surface on its under side. Inasmuch as the upper surface of the contact plates 13 and of the intermediate perforated plates 14 are in the same plane, the contact springs always bear either on the arms of the contact plates 13 or on the intermediate plates 14.

The circuit in the apparatus proceeds from the bearing 25 to shaft 22 to the several contact springs 31, to contact plates 13 to shaft 2 and bearing 5. The bearings 5 and 25 may be connected with any desired number of glow lights as indicated diagrammatically at 32.

The operation of the device depends upon the 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, that the luminous intensity of the apparently unbroken ray can be varied by varying the duration of the intervals. The resulting physical effect on the eye is that of an unbroken ray which is decreased or increased in luminous intensity at will. Assume now that the shaft 2 is rotated by electric motor 6, so that the arms of the contact plates 13 move in the direction of the arrow in Fig. 1. Obviously circuit will be completed to the lamps whenever the arms of the metal contact plates 13 come under the springs 31, and for a period represented by the distance in arc *a*, *b*, in Fig. 1. Circuit will be broken during the period represented by the distance in arc *b*, *c*, when the insulating plate 14 runs under the spring. The speed of rotation of shaft 2 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 current in the lamp circuit is to be greater per second than

the eye can appreciate. Now suppose the arm 30 to be swung outwardly by turning its shaft 22, so that the center line of said arm comes to the position b' Fig. 1. Then the period of time during which circuit is made to the lamps is somewhat reduced, and is represented by the distance in arc a' b', while the period during which the circuit is broken, represented by the distance in arc b' c' is greatly increased. On the other hand, if the arm be swung inwardly so that the center line of said arm comes to the position b'' then the period of time during which circuit is made to the lamps is somewhat increased and is represented by the distance in arc a'' b'', while the period during which the circuit is broken represented by the distance in arc b'' c'' is greatly decreased. In other words, as the arm is swung on its shaft the relation of the periods of make and break is altered, the break periods being increased as the arm is moved outwardly and decreased as it is moved inwardly.

In practice the arm 30 is moved to its outermost position and the speed of the shaft 2 is regulated until the lamps show steady glow, thus indicating that although the breaks in the circuit are at a maximum with respect to the makes, they are occurring with a frequency too great for the eye to recognize them. The degree of luminosity of the lamps will then bear a relation to the relative periodicities of the makes and breaks and be at a minimum. As the arm 30 is moved inward these relative periodicities change, and as those of the breaks constantly diminish the luminous intensity of the lamps constantly increases, so that in order to vary said intensity it is simply necessary to turn the arm 30 in one direction or the other by means of lever 26, and when the desired intensity is obtained the lever may be secured by inserting pin 28 in the proper aperture of plate 27.

The object of filling the box 1 with oil is to prevent sparking or arcing as the contact arms run from under the springs 31, and this is still further avoided by means of the buckets which constantly take up the oil and project it in streams through the adjacent openings.

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:—

The combination of a box for containing a liquid dielectric, a rotary shaft therein, a radially disposed contact plate on said shaft, a contact supported independently of said shaft, bearing on the surface of said plate and movable in a direction radial to said shaft and buckets on said plate having inclined surfaces for projecting said dielectric upon the bearing surface of said contact.

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

THOMAS E. MURRAY.

Witnesses:

PETER P. SMITH,

ARTHUR R. STORM.