Oct. 16, 1928.

1,687,628

A. F. MARTIN

RHEOSTAT

Filed May 10, 1924

3 Sheets-Sheet 1

Fig. 1

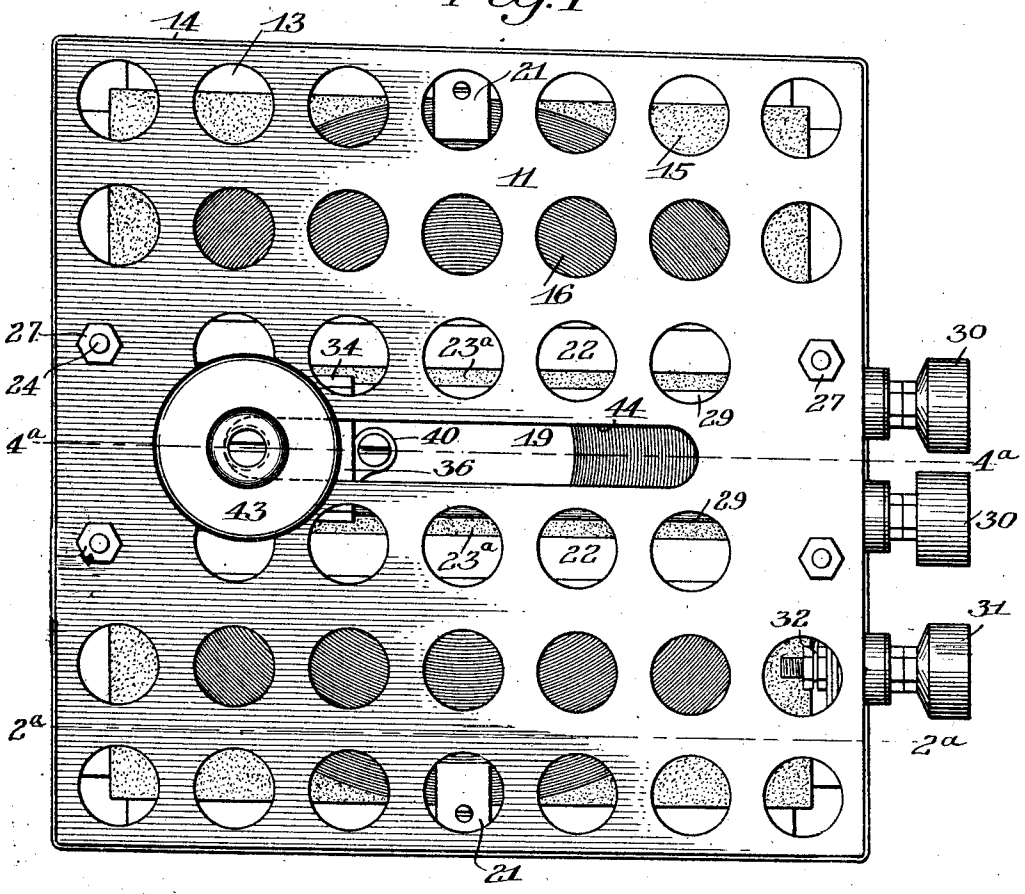
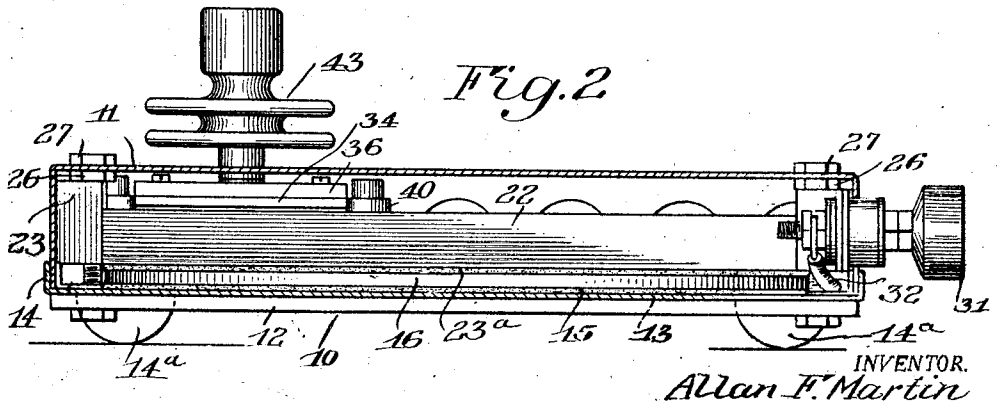


Fig. 2



INVENTOR.
Allan F. Martin
BY Frederick F. Church
his ATTORNEY

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A. F. MARTIN

RHEOSTAT

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Fig. 3

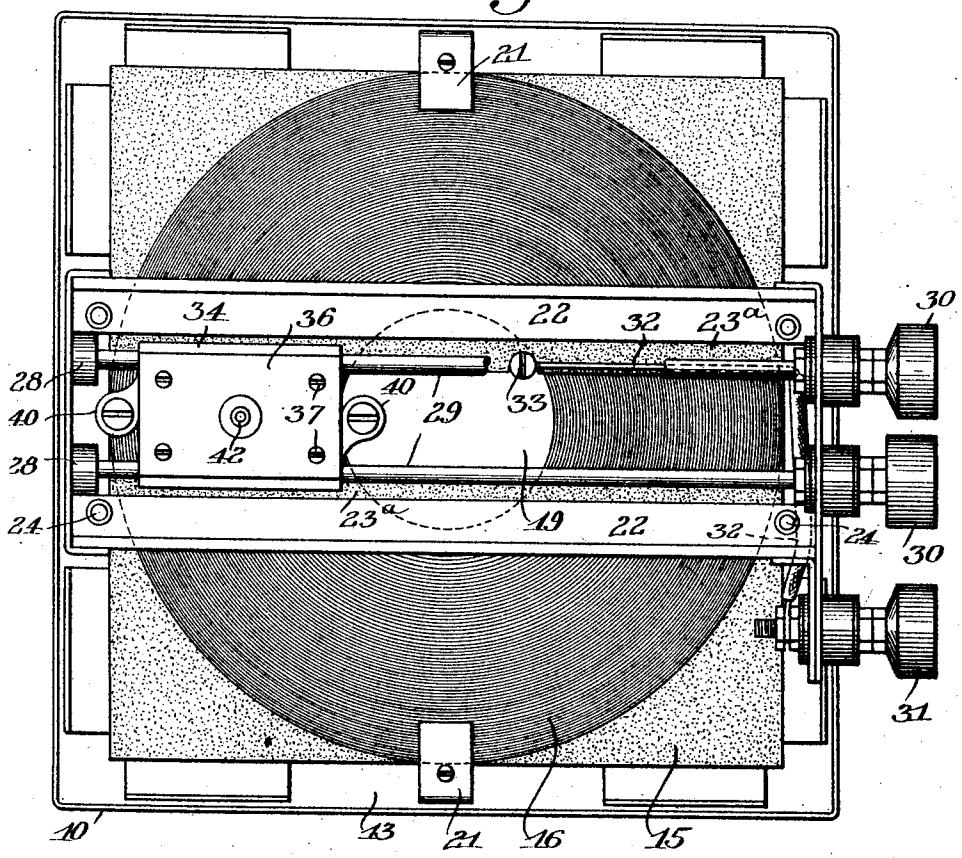
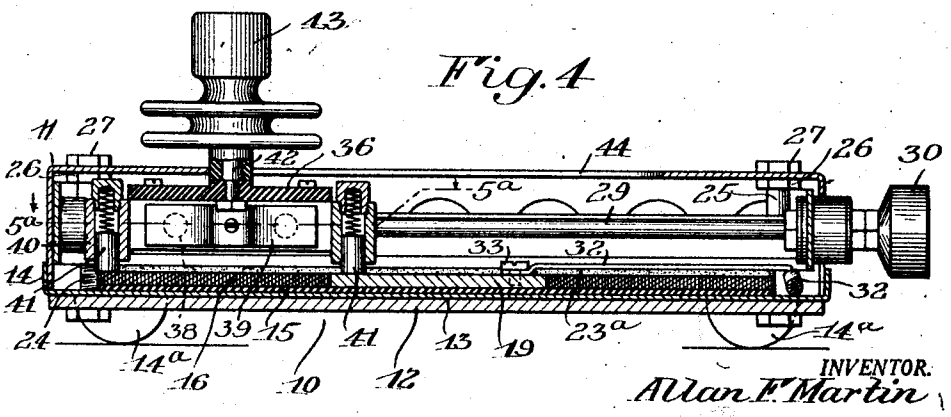


Fig. 4



INVENTOR.
Allan F. Martin
BY Frederick F. Church
his ATTORNEY.

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A. F. MARTIN

RHEOSTAT

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3 Sheets-Sheet 3

Fig.5

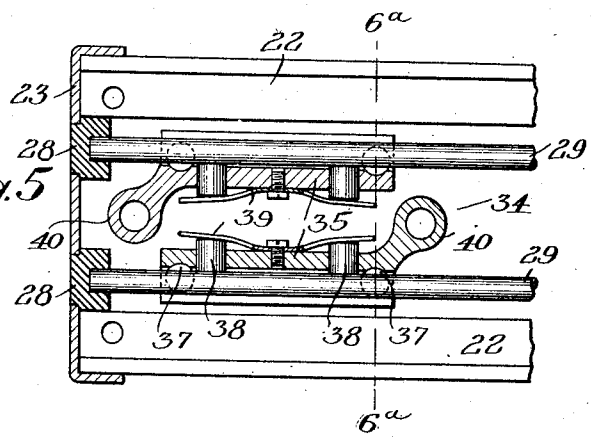


Fig.8

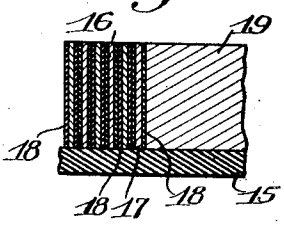


Fig.6

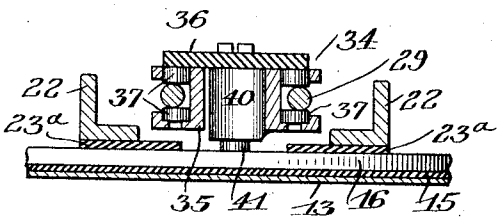
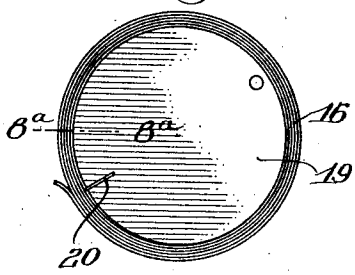


Fig.7



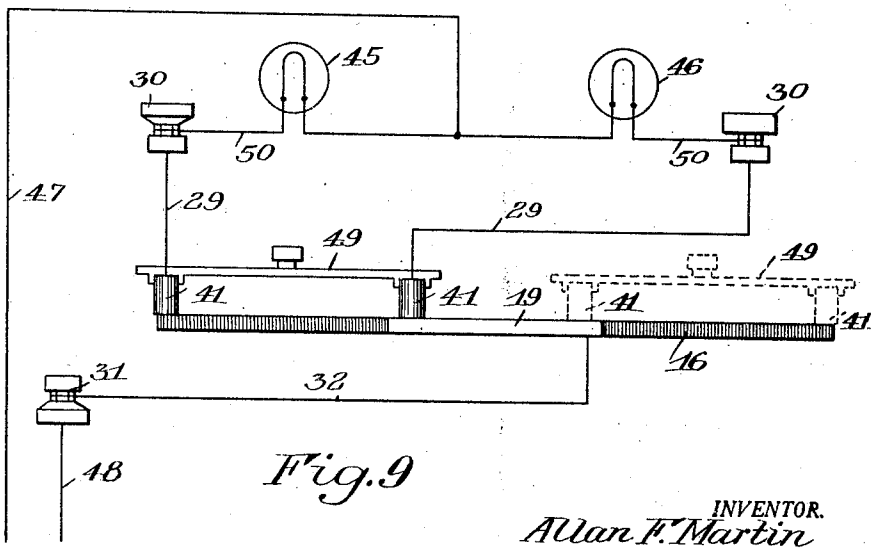


Fig.9

INVENTOR.
Allan F. Martin
BY Frederick T. Church
his ATTORNEY

Patented Oct. 16, 1928. 1,687,628

UNITED STATES PATENT OFFICE.

ALLAN F. MARTIN, OF ROCHESTER, NEW YORK, ASSIGNOR TO BAUSCH & LOMB OPTICAL COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

RHEOSTAT.

Application filed May 10, 1924. Serial No. 712,245.

This invention relates to electrical apparatus and more particularly to resistance means or rheostats, one object of the invention being to provide an improved apparatus of this class embodying a more simple, compact and efficient construction and arrangement of parts capable of being manufactured at a comparatively low cost. Another object is the provision of an advantageous apparatus of this character particularly adapted for the differential control of operating circuits such as the lamp circuits of a dissolving view projection apparatus.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a top plan view of an apparatus embodying the present invention.

Figure 2 is a sectional elevation on line 2^a—2^a in Figure 1.

Figure 3 is a view similar to Figure 1 but with the cover plate removed.

Figure 4 is a view similar to Figure 2 but showing interior parts in section also.

Figure 5 is a sectional plan view of details on the line 5^a—5^a in Figure 4.

Figure 6 is a sectional elevation on the line 6^a—6^a in Figure 5.

Figure 7 is a plan view of a portion of the resistance means detached.

Figure 8 is an enlarged sectional view on the line 8^a—8^a in Figure 7; and

Figure 9 is a diagrammatic view of the electrical connections.

Similar reference numerals throughout the several views indicate the same parts.

The preferred embodiment of the invention, herein disclosed by way of illustration, comprises a supporting means or frame including a base portion 10 and a cover plate 11, more particularly described hereafter. The base portion 10 comprises a plate 12 of substantial thickness and rigidity on which is carried a substantially square sheet metal plate 13 having upturned marginal flanges 14 and at the corners of the underside of plate 13 are supports 14^a of rubber or other soft material. Over the plate 13 is placed a layer of asbestos 15 or other insulating material on which rests the resistance means now to be described.

The resistance means comprises preferably a resistance element of the usual or any suitable form of resistance wire or other material which is wound progressively upon itself substantially in a plane and in the form of a comparatively thin disk 16 lying compactly against the sheet 15 of insulating material on the base. The resistance element may be in sections having different resistances and may be of various cross sectional forms. In the present instance, however, the resistance element is in the form of a single strip or ribbon, 17, Figures 7 and 8, of nickel-iron alloy of uniform cross section, and the strip is wound spirally to afford a flat disk as shown. The adjacent windings may be separated or insulated in any suitable manner, being in the present instance insulated from each other by an oxidized coating as more particularly shown in Figure 8 where 18 represents the insulating coating. The ribbon is preferably wound on a member or disk 19 of copper or other conducting material with which the inner end of the resistance spiral is electrically connected as by fixing the exposed or uninsulated inner end 20 of the ribbon in a kerf in the periphery of the disk for a purpose hereafter explained. The resistance spiral is secured in place on the insulating material 15 of the base by clips 21 on the base projecting over the periphery of the spiral and insulated therefrom in any suitable manner.

The contact means cooperating with the resistance means described above comprises, preferably, an auxiliary frame having angle-bars 22 connected in spaced relation by end plates 23, Figure 5. The bars 22 extend centrally across the resistance spiral 16, resting upon insulating strips 23^a laid on the latter and the bars are secured to the main frame by means of bolts 24, Figure 4, passing vertically through their ends and through the base plates 12 and 13 and the cover plate 11. These bolts carry spacing sleeves 25 bearing at one end on top of the bars 22 and at the other against a nut 26 on the bolt by means of which the rails are securely clamped to the base. Nuts 27 on the ends of the bolts secure the cover in place.

The end plates 23 of the auxiliary frame have fixed therein buttons 28 of insulating material, Figure 5, in which are supported the ends of spaced guide rods 29 extending centrally across the resistance spiral and parallel with the plane thereof. These rods

are preferably of conducting metal being extended at one end through the cover plate 11 and provided with binding posts 30. A third binding post 31, carried by and also insulated from the cover plate, is connected by means of a wire 32 with the conducting member 19, as at 33, Figure 3.

The contacts are carried by a carriage 34, Figures 5 and 6, comprising preferably a pair of channel shaped parts 35 connected at their tops in spaced relation by a plate 36 of insulating material secured to the channels as by means of screws 37, Figure 3. The flanges of the channels embrace the respective guides 29 as shown and are preferably maintained in continuous electrical contact therewith as by means of brushes 37 sliding in sockets in the channel flanges, as well as by similar brushes 38 sliding in sockets in the web of each channel and pressed against the guides by the leaf springs 39. At one end of each channel there is a socket extension 40 in which is carried a contact 41 for electrical contact with the resistance means below. These contacts are at opposite ends of the carriage and are spring supported in the usual manner. It is apparent from this construction that each contact is in continuous electrical contact through its supporting channel and guide 29 with the corresponding binding post 30 and the contacts are suitably spaced in the direction of sliding movement of the carriage so that in the extreme positions of the latter one contact engages with the periphery or outer windings of the resistance spiral while the other is in contact with the central conducting member or disk 19. The carriage has fixed in its top plate 36 a stud 42 carrying a handle or knob 43 projecting through a slot 44 in the cover plate 11 and it is apparent that as the carriage is slid on its guide by the handle, its contacts successively engage the different windings of the resistance element and the central conducting member 19. That is to say, the voltage supplied through binding post 31 to the central member 19 is transmitted unreduced through either contact while the latter is in engagement with the member 19 or in a variably reduced amount determined by the movement of the contact over the windings successively to a greater or less distance from member 19 to include a greater or less length of the resistance element.

The spaced arrangement and simultaneous movement of the pair of contacts disclosed in the present embodiment particularly adapt the device for the differential control of a pair of circuits, such, for example, as the lamp circuits of a dissolving view projection apparatus. Such an application is illustrated schematically in Figure 9, where 45 and 46 represent a pair of lamps having one terminal of each connected with one side 47 of a power circuit, the other side 48 of which is shown as connected with the binding post 31. The latter is connected as shown with the central member 19 about which is shown the resistance spiral 16. The contacts 41 are shown as connected by the carriage 49 for simultaneous movement as described, the contacts being connected with the respective binding posts 30. The latter are connected by wires 50 with the other terminals of the lamps. In the position of the carriage and contacts shown in full lines, the full voltage is applied to lamp 46 while the full length of the resistance element is included in the circuit of lamp 45 so that the latter is effectively dimmed or extinguished. By moving carriage 49 towards the right, resistance is gradually cut out of the circuit of lamp 45 as successive windings of the resistance element are engaged by the corresponding contact so that lamp 45 is gradually illuminated, the insulating coating of the windings being of course removed over the path of the contacts. Member 19 is preferably of such a diameter as to maintain lamp 46 at its full illumination while the illumination of lamp 45 is being built up. At a suitable point, however, the contact of lamp 46 leaves the opposite side of member 19 and passes successively over the windings of the resistance spiral so that the illumination of lamp 46 is reduced as that of lamp 45 is increased. Finally the other extreme position is reached in which lamp 46 is fully energized and illuminated by engagement of its contact with member 19, while lamp 46 is extinguished by the movement of its contact to the periphery of the resistance spiral. The construction thus effectively provides for the differential control of the circuits in a substantially proportional manner or, if desired, with retardation of one relative to the other by the member 19 as described. Such retardation is afforded also to a degree by the greater lengths of the windings at the periphery of the spiral. The construction is obviously simple, requiring but few parts of practical and inexpensive form.

I claim as my invention:

1. A rheostat comprising a conducting member, a resistance element wound about said conducting member substantially spirally in a plane, and a contact comprising a pair of spaced elements movable one over said plane toward and from the spiral axis in direct contact with successive windings of said element and the other in contact with said conducting element.

2. A rheostat comprising a resistance element wound substantially spirally in a plane, a conducting member electrically connected with an end of said element, a contact comprising a pair of spaced elements movable one over said plane in direct contact, successively, and the other in contact with the windings of said element and with said member, and means for connecting said member and contact in an external circuit.

3. A rheostat comprising a resistance element wound progressively upon itself substantially in a plane, a conducting member adjacent the center of said windings and electrically connected with an end of said element, a pair of contacts movable over said plane in electrical contact, successively, with the windings of said element and with said member, and means for connecting said member and said contacts in an external circuit.

4. In a rheostat, the combination of supporting means, a resistance element on said means wound substantially spirally in a plane, a conducting member adjacent the axis of said spiral and electrically connected with an end of said element, a carriage mounted on said means for sliding movement parallel with said plane, a pair of contacts on said carriage spaced from each other in the direction of movement thereof for successive electrical contact with said windings and with said member, and means for connecting said member and said contacts with an external circuit.

5. In a rheostat, a frame, a resistance element on said frame wound spirally in a plane, a conducting disk about which said element is wound with an end of the latter connected electrically with the disk, spaced conducting guides on said frame parallel with said plane, a carriage sliding on said guides, a pair of contacts on said carriage for successive electrical contact with said disk and windings and each in electrical connection with one of said guides, said contacts being suitably spaced in the direction of movement for simultaneously engaging the periphery of said spiral and said disk, respectively, and means for connecting said disk and guides in an external circuit.

6. In a rheostat, a frame, a spirally wound resistance element upon the frame, a conducting member, a guide on said frame and a member including a pair of spaced contacts slidable upon the guide and one being adapted to successively engage the different windings of said element and the other arranged to engage said conducting member.

7. In a rheostat, a frame, a spirally wound resistance element upon the frame, a conducting member about which said element is wound and with which it is electrically connected, a circuit connection leading to said member, a conducting guide on said frame provided with a circuit connection, a carriage movable upon said guide in proximity to said resistance element, and separate contacts upon the carriage, one of which is adapted to move in engagement with the resistance element and the other in engagement with said conducting member.

ALLAN F. MARTIN.