

Oct. 5, 1937.

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2,094,867

HYDRAULIC REFLECTOR ARC

Filed Aug. 24, 1936

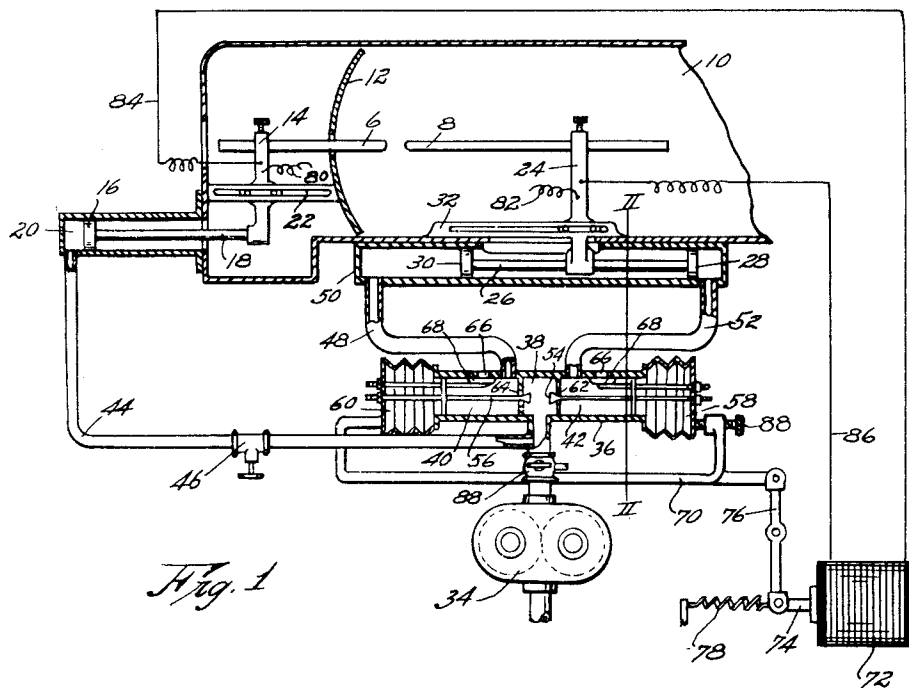


Fig. 1

Fig. 2

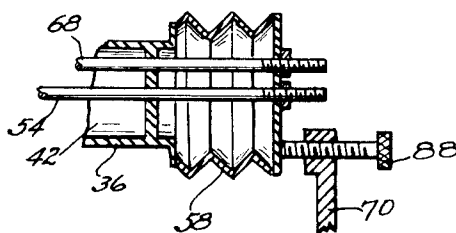
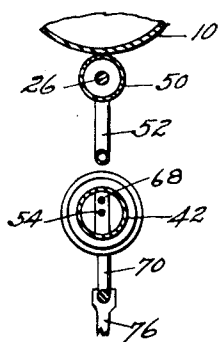


Fig. 3

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UNITED STATES PATENT OFFICE

2,094,867

HYDRAULIC REFLECTOR ARC

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Application August 24, 1936, Serial No. 97,569

8 Claims. (Cl. 176—55)

This invention relates to arc lamps of the character wherein a pair of carbon-electrodes are employed and maintained in proper spaced-apart relation, to the end that desired brilliancy of the art is constantly produced.

The primary object of the invention is the provision, in such a device, of combined hydraulic and electrical means for automatically maintaining the ends of the carbon-electrodes in predetermined, desired, spaced relation.

Another important object of the invention is the provision of means, for automatically maintaining the ends of the carbons a predetermined distance apart, which means is controlled by electrical elements receiving current through a circuit including the carbon-electrodes themselves, whereby the amount of electrical energy reaching the controlling elements is governed by the distance between said carbon-electrodes.

A yet further aim is to provide novel structure for embodying the invention that is simple and rugged, will perform the duties contemplated, and will be inexpensive to make and operate.

Other objects of the invention include the details of construction, which will be fully described in the following specification, referring to the accompanying drawing, wherein:

Figure 1 is a schematic view of the entire hydraulic reflector arc mechanism and system.

Fig. 2 is a fragmentary, detailed, sectional view, taken on line II—II of Fig. 1, and,

Fig. 3 is an enlarged, fragmentary, detailed, sectional view through one of the bellows forming a part of the manifold and valve controlling means.

Structures contemplated by this invention might advantageously be used in connection with moving picture projecting machines and other illuminating devices wherein a pair of carbon-electrodes are employed that must be moved toward or from each other as the intensity of the arc at the ends of the carbon-electrodes varies. Efficient and reliable means, controllable by the actual arc itself or distance apart of the carbon-electrodes is, therefore, desirable and such means is illustrated herewith.

The carbon-electrodes 6 and 8, of conventional character and hereinafter referred to as "carbons", are mounted within a lamp housing 10 before a suitable reflector 12. Obviously, carbons 6 and 8 might be positioned as shown or disposed at an angle to each other. Carbon 6 is carried in a holder 14, in connection with piston 16, through the medium of rod 18, and pis-

ton 16 is reciprocally contained in cylinder 20. Any suitable track element 22 may be employed to permit rectilinear reciprocation of carbon 6. In some instances, however, track 22 may be altered to move carbon 6 toward and from associated carbon 8 through a path other than a straight one. A similar holder 24 carries carbon 8 and is likewise in connection with a piston 26, having two faces 28 and 30, against which the later described liquid under pressure may exert a force. Holder 24 is carried by a suitable track 32 so that carbon 8 may also be moved toward and from carbon 6 and, in the instance exemplified, this movement is through a straight rectilinear path.

The element employed for actually imparting force to pistons 16 and 26 is oil or other suitable fluid that is maintained under pressure by a pump 34 in connection with a manifold 36, provided with a central compartment 38 and end compartments 40 and 42 respectively.

A pipe 44 is directly connected to that part of manifold 36 which creates a central compartment 38 at its one end, and with one end of cylinder 20 at its other end. Thus, as pump 34 is operated, continuous pressure is exerted against piston 16 so that carbon 6 will be maintained in a fixed position. A control valve 46 is interposed in pipe 44 between its ends to govern the flow of liquid under pressure which is maintained against piston 16.

A pipe 48 connects one end of cylinder 50, which contains piston 26, and compartment 40 of manifold 36. Another pipe 52 connects the other end of cylinder 50 with the other compartment 42 so that liquid under pressure might exert a force alternately or simultaneously against faces 28 and 30 of piston 26.

Unique means for governing the amount of liquid under pressure which passes through pipes 48 and 52 is provided. A valve member 54 controls the amount of liquid passing from pump 34 through pipe 52 and a similar valve member 56 likewise controls the amount of liquid passing from pump 34 to pipe 48. Each of these valve members 54 and 56 is in connection with a bellows 58 and 60 respectively. These bellows form a part of compartments 42 and 40 respectively and merely constitute means for allowing members 54 and 56 to function without loss of liquid.

Ports 62 and 64, controlled by valve members 54 and 56 are opened and closed as the latter are moved. A pair of escape ports 66 is provided in manifold 36. One port 66 is in communication

with compartment 40, while the other port is in communication with compartment 42. Valve members 68 control these ports 66 and move with valve members 54 and 56.

Means is provided to move bellows 58 and 60 and the associated parts just described. This means is in the form of a yoke 70 in connection with a solenoid 72 having the conventional reciprocable core 74. Link 76 establishes connection between yoke 70 and core 74, and a spring 78 yieldably urges link and core toward one end of a path of travel. The solenoid is in circuit with carbons 6 and 8 and a source of supply is in connection with wires 80 and 82 which are connected to holders 14 and 24 respectively.

The circuit, therefore, may be traced as follows: from the source of supply, not here shown, wire 80, wire 84, coil 72, wire 86, and thence back to the source through wire 82. The control coil 72 may be either in series or across the arc, or any electrical combination of the two, so long as the distance apart of the ends of carbons 6 and 8 have a direct bearing upon the amount of current passing through coil 72 and will vary the amount as the distance is increased or decreased.

The operation of the device is apparent, and it is obvious to one skilled in the art that movement on the part of yoke 70 will allow related amounts of liquid under pressure to pass into cylinder 50 and thereby maintain piston 26 at a proper place therein. A pressure relief valve 88 is used and the entire mechanism may be encased in the liquid sump from which pump 34 obtains its supply.

A set screw 88 is adjustably mounted in one end of yoke 70 so that the bellows 58 and 60 might move independently of the yoke and also therewith. Set screw 88 abuts bellows 58 and therefore is capable of collapsing it in one direction only.

It is conceivable that other electrode elements may be positioned upon the mechanism that moves with the two carbons 6 and 8 so that the relative positions of these electrode elements will have a bearing upon the amount of current passing through the coil of solenoid 72 to thereby perform the same duty as the mechanism herein described. Because of the nature of the system contemplated by the invention, it is possible to embody the same in devices having widely varying characteristics and, therefore, it is desired to be limited only by the spirit of the invention and scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. The combination with a pair of carbons, means maintaining the ends thereof a predetermined distance apart comprising a movable holder for each carbon; a piston in connection with each holder; a cylinder for each piston; means supplying liquid under pressure to the cylinders; and means controlling the supply of liquid to relatively move the carbons through the medium of the pistons.

2. The combination with a pair of carbons, means maintaining the ends thereof a predetermined distance apart comprising a reciprocable holder for each carbon; a piston in connection with each holder; a cylinder containing each piston; a pump supplying liquid under pressure to the cylinders; a pipe joining the pump and one of said cylinders at a point to supply liquid under pressure to move the piston in one direc-

tion; a pair of pipes joining the pump and the other cylinder at other points to supply liquid under pressure to alternately move the piston in two directions; and means controlling the passage of liquid under pressure through the said two pipes.

3. The combination with a pair of carbons, means maintaining the ends thereof a predetermined distance apart comprising a reciprocable holder for each carbon; a piston in connection with each holder; a cylinder containing each piston; a pump supplying liquid under pressure to the cylinders; a pipe joining the pump and one of said cylinders at a point to supply liquid under pressure to move the piston in one direction; a pair of pipes joining the pump and the other cylinder at other points to supply liquid under pressure to alternately move the piston in two directions; means controlling the passage of liquid under pressure through the said two pipes; and means causing a predetermined constant amount of liquid under pressure to pass through the pipe joining the pump and first mentioned cylinder.

4. In a hydraulic feeding system for arc lamps, a pair of carbons; a holder for one of the carbons; a piston in connection with the holder; a cylinder containing the piston; a pump supplying liquid under pressure to the cylinder; a pipe joining the pump and cylinder on each side respectively of the piston; and means simultaneously controlling the flow of liquid under pressure through both of said pipes.

5. In a hydraulic feeding system for arc lamps, a pair of carbons; a holder for one of the carbons; a piston in connection with the holder; a cylinder containing the piston; a pump supplying liquid under pressure to the cylinder; a pipe joining the pump and cylinder on each side respectively of the piston; and means for simultaneously controlling the flow of liquid under pressure through both of said pipes, said means being movable to relieve pressure when the arc length is correct whereby to cause the associated carbon to remain in a predetermined spaced relation to the other carbon, said controlling means having an electrically operated driving member in electrical connection with the two carbons.

6. In a hydraulic feeding system for arc lamps, a pair of carbons; a holder for each carbon; a piston supporting one of the holders; a cylinder containing the piston; a pump supplying liquid under pressure to the cylinder; a pipe joining the pump and cylinder on each side respectively of the piston; a valve in each pipe controlling the amounts of liquid under pressure passing there-through; a solenoid simultaneously opening and closing the valves; and an electrical circuit, having a source of current, connecting the said solenoid, and pair of carbons.

7. In a hydraulic feeding system for arc lamps, a pair of carbons; a holder for each carbon; a piston supporting one of the holders; a cylinder containing the piston; a manifold provided with a central and end compartments and escape ports in communication with the end compartments; a pump in connection with the central compartment supplying liquid under pressure thereto; a pipe joining one end compartment and the said cylinder on one side of the piston; another pipe joining the other end compartment and the said cylinder on the other side of the piston; a valve between the said central compartment and each end compartment respectively controlling the

flow of liquid under pressure; and common means simultaneously closing one valve and opening the other and vice versa, said means serving to open and close said escape ports.

5 8. In a hydraulic feeding system for arc lamps, a pair of carbons; a holder for each carbon; a piston supporting one of the holders; a cylinder containing the piston; a manifold provided with a central and end compartments and escape
10 ports in communication with the end compartments; a pump in connection with the central compartment supplying liquid under pressure thereto; a pipe joining one end compartment and the said cylinder on one side of the piston; an-
15 other pipe joining the other end compartment

and the said cylinder on the other side of the piston; a valve between the said central compartment and each end compartment respectively controlling the flow of liquid under pressure; and
5 common means simultaneously opening and closing the said valves and opening and closing said escape ports comprising a solenoid moving the means in one direction, a spring moving the means in the opposite direction, and a circuit
10 having a source of electrical current in connection with the solenoid and carbons, whereby the distance between ends of the carbons governs the amount of current passing to said solenoid.

HARRY W. BAKER. 15