J. A. DALZELL & C. E. HARTHAN.

ARC LAMP.

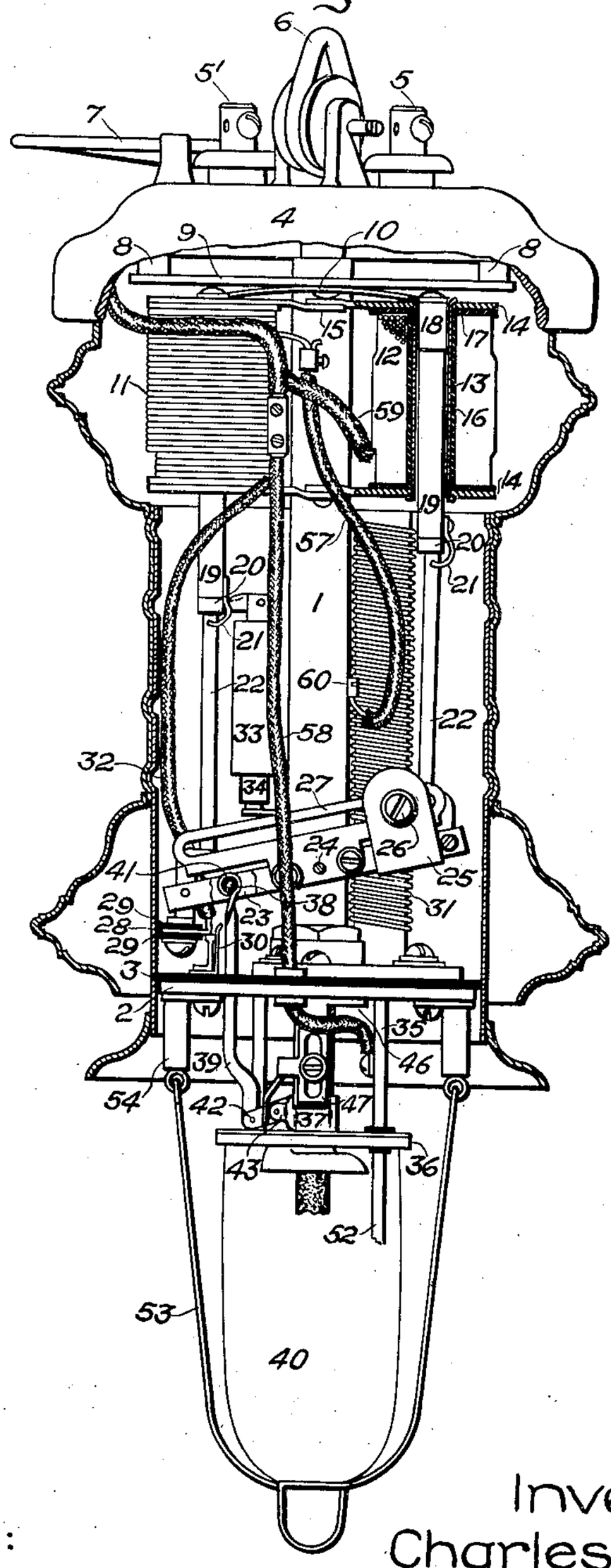
APPLICATION FILED FEB. 11, 1904.

900,709.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Irving E. Steers.
Helen Orford

Inventors,
Charles E. Harthan,
James A. Dalzell.
by Albert G. Davis
Atty.

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2 SHEETS—SHEET 2.

Fig. 2.

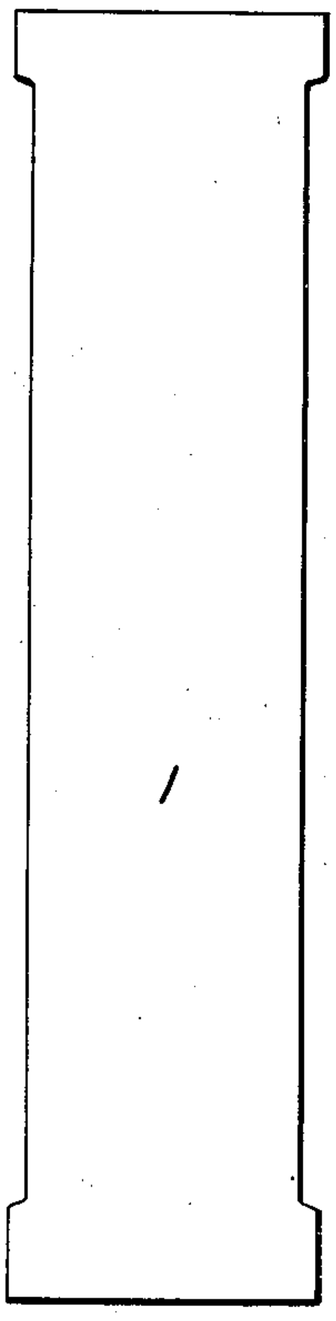


Fig. 3.

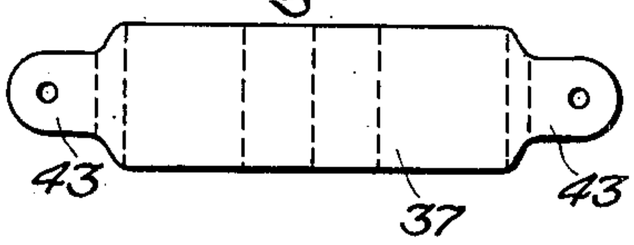


Fig. 4.

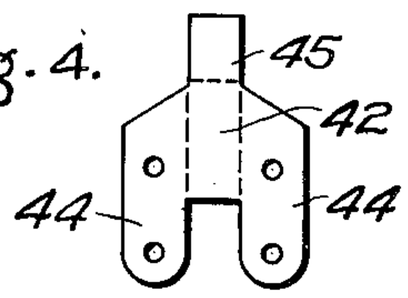


Fig. 5.

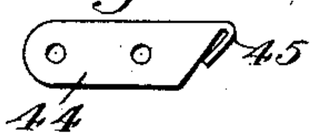


Fig. 7.

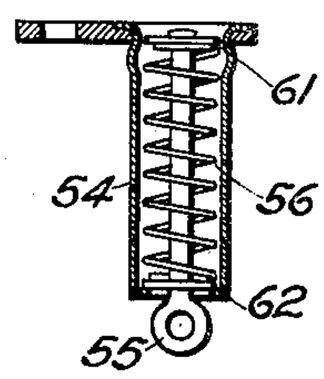


Fig. 6.

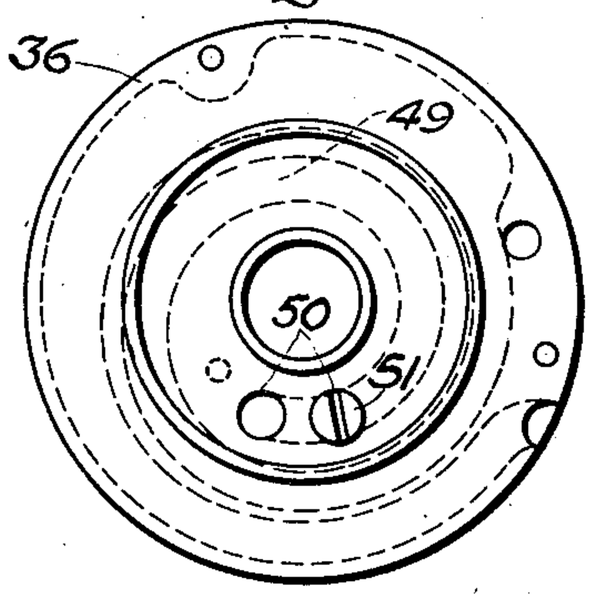
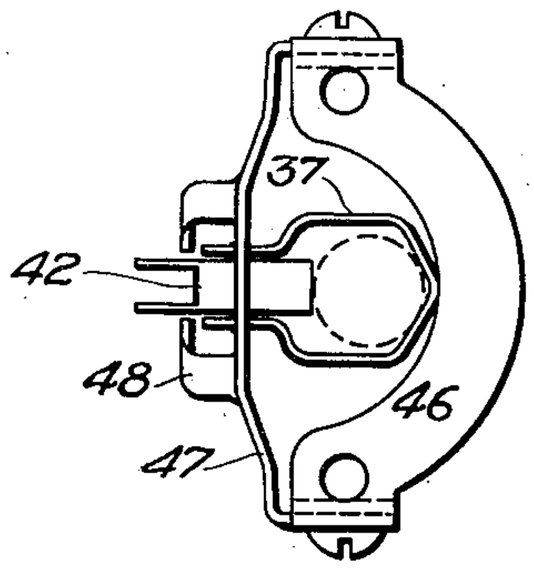


Fig. 8.



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Atty.

UNITED STATES PATENT OFFICE.

JAMES A. DALZELL AND CHARLES E. HARTHAN, OF LYNN, MASSACHUSETTS, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ARC-LAMP.

No. 900,709. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed February 11, 1904. Serial No. 193,095.

To all whom it may concern:

Be it known that we, JAMES A. DALZELL and CHARLES E. HARTHAN, citizens of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a specification.

This invention relates to arc lamps, and its object is to improve certain details of construction, whereby the cost of the lamp is greatly decreased and its operation improved.

One feature of the present invention is that a number of the parts of the lamp, such for instance as the clutch-connecting rod, the jaw and yoke of the clutch and the metallic parts of the magnet spools are made from sheet-metal. Blanks of the required shape are punched out and then bent to the particular form desired. Prior to our invention most of these parts have commonly been cast at a cost greatly in excess of the cost of making them from sheet-metal. We have therefore succeeded in effecting a considerable reduction in the cost of the lamp without impairing its strength or durability in any way.

Other features of the invention are the provision of guides for the clutch and a gas-cap having a gas-passage which may be partially or entirely closed, as desired.

The novel features of our invention will be definitely indicated in the appended claims; the details of construction and the mode of operation will be better understood by reference to the accompanying drawings which show one embodiment of our invention and in which

Figure 1 is a sectional elevation of an arc lamp equipped with our improvements, and Figs. 2 to 8 inclusive are detail views of the various parts.

In the drawings we have shown an arc lamp of the differential type for use in series on an alternating-current circuit in connection with constant-current transformers, but it must be understood that the improvements are not limited in any way to any particular type of lamp.

Referring to Fig. 1, 1 indicates the slotted carbon-tube or backbone which is secured at its lower end to the annular base-plate 2 but insulated therefrom by the disk of insulating material 3. At its upper end the backbone 1 is secured to but insulated from the lamp top 4 which carries the binding-posts 5 5′, the insulated suspending-link 6 and the cut-out switch 7. Instead of using a drawn or cast tube in making the backbone 1, as has been the common practice heretofore, we form the backbone from a sheet-metal blank. We have found that a slotted carbon-tube can be made in this way quite strong enough for the purpose and at a cost much less than those heretofore made. This reduction in the cost is greater because of the fact that the slot in the tube may be provided for in punching the blank instead of cutting it in the completed tube in a separate operation. The sheet-metal blank for the backbone is shown developed in Fig. 2; it is rectangular in shape except for a cut-away portion on one or both sides, which, when the blank is curled into a tube, forms the slot through which connection is made to the movable electrode.

Suspended from the under side of the lamp top 4 by posts 8 8 but insulated therefrom are two plates 9, one on either side of the backbone 1, from which are suspended, by two flat U-shaped springs 10, two pairs of solenoids 11 12, the former being wound with coarse wire and connected in series with the arc, and the latter with fine wire and in shunt to the arc. The spools on which the coils of these solenoids are wound are preferably constructed as shown on the right of Fig. 1. A sheet-metal blank, preferably brass, is curled to form a tube 13 which is covered with insulating material, preferably by winding heavy paper thereon to form a tube 16, and insulating washers 17 are placed on tube 16. The heads 14 of the spools are then placed on the ends of tube 13 and the ends of the tube are turned over to hold the heads securely, For greater rigidity, the heads may be soldered to tube 13. The heads 14 are also metal punchings circular in form and provided with integral projecting ears 15 by which the spools are all tied together as shown in the drawings. If it is desired, the insulating tube 16 may be formed separately of heavy paper and placed over tube 13 instead of winding the paper on the tube, and the washers 17 may be split and sprung over the tube after the spool is completed. A spool made in this manner is strong and rigid, the metallic parts are well insulated, and the cost of production is small. Each spool of the shunt magnet has a fixed laminated core

18 suspended by ears attached to the upper head of the spool and extending down part way through the spool. A movable core or armature 19 is provided for each pair of spools, composed of U-shaped laminations fastened together. A flat spring 20 is secured at each end to the cross-bar of each movable core, the downward flexure of the spring being limited by a fixed stop 21 depending from the cross-bar. The connecting rods 22 are attached to the springs 20, each extending down to a pivotal connection with one end of a rocker 23 composed of two parallel bars, one on either side of the backbone 1 and pivoted to the backbone at 24. The two armatures practically balance each other and in order to be able to adjust this balance a weight 25 is mounted on the rocker and provided with a clamping screw 26 which enters a longitudinal slot in a bar 27 attached to the rocker 23 so that the weight can be adjusted on either side of the pivot 24.

Secured to one end of the rocker between plates 29 of insulating material is a contact 28 connected by a flexible lead 32 to the negative binding-post 5′ of the lamp and cooperating with a spring contact 30 mounted on the insulating disk 3 to form a cut-out switch. Contact 30 is connected to a coiled resistance wire 31 wound on a metallic tube covered with insulating material, which is mounted on the base 2 of the lamp. An inverted dash-pot 33 is pivotally connected to the armature 19 of the series magnet 11 and coöperates with a stationary plunger 34 loosely attached to an arm projecting from the backbone 1.

Rigidly suspended from the base-plate 2 by posts 35 which are insulated from the base-plate by suitable bushings, is a gas-cap 36 which closes the top of the inner, arc-inclosing globe 40 and which serves as a tripping platform for the clutch. Loosely mounted on a rod 38 extending between the two bars of the rocker 23 is a spool 41 of wood or other insulating material, to which is secured the clutch-connecting rod 39. This rod is a sheet-metal punching twisted at right angles near its upper end as shown in Fig. 1 and bent around the cylindrical portion of the spool 41. At its lower end rod 39 is pivotally connected to the clamp-jaw 42 of the clutch which is pivoted in ears 43 on the yoke 37 of the clutch. Yoke 37 and jaw 42 are also formed from sheet-metal blanks, shown developed in Figs. 3 and 4. The blank for the yoke is of rectangular shape with perforated projections on its ends to form the ears 43. The blank is bent to substantially hexagonal shape, as shown by the dotted lines in Fig. 3, and the ears 43 are bent out parallel to each other as shown in Fig. 1. The blank for jaw 42 has wings 44 44 which are bent down perpendicular to the body portion as indicated by the dotted lines in Fig. 4 to form the sides of the jaw and a projecting tongue 45 which is bent under to form the tooth or engaging portion, as shown in Fig. 5. The wings 44 of the blank 42 are provided with holes for pivotally connecting the jaw to the rod 39 and yoke 37. Secured to the base-plate 2 but insulated therefrom is a sheet-metal support 46 having depending arms on which is adjustably mounted a clutch-stop 47 extending between the arms directly over the ears 43 of the clutch yoke 37 as shown in Figs. 1 and 8. The yoke 37 abuts against the clutch-stop 47 and pawl 42 is forced more firmly into engagement with the movable electrode, thereby avoiding "sneak" feed. Clutch-stop 47 is also a sheet-metal punching and is formed with two depending arms 48 which extend down on either side of jaw 42 and guide the clutch in its vertical movement.

The gas-cap 36 has a spiral gas-passage 49 formed in it as shown in dotted lines in Fig. 6, through which the gases from the arc pass. The entrance to this passage is through two or more holes 50 which are threaded and in one or more of which screws 51 may be inserted to partially or entirely close the entrance to the gas-passage. In this manner the speed of exchange of air for the escaping products of combustion within the inclosing globe can be regulated or adjusted to best suit the particular kind of electrodes which are employed, and the particular length of arc which it is desired to maintain. The lower electrode is supported in a holder not shown in the drawings but secured to the end of the rod 52 which is suspended from the base-plate 2 and insulated from the base-plate and gas-cap 36. The globe 40 is held tightly against the gas-cap 36 by a spring-suspended wire bail 53 formed with a horizontal loop in which the end of the globe rests, and a vertical loop which serves as a finger-hold. The supports for the bail 53 are coiled springs 56 each held in a tubular casing 54 secured to the under side of the base-plate 2. A sheet-metal plunger 55 extends up through each spring 56 and is spread at its end to retain a washer 61 against which the end of spring 56 presses. The lower end of plunger 55 is provided with a loop which receives the end of bail 53. Another washer 62 loose on plunger 55 closes a slot in the bottom of casing 54 through which the looped end of plunger 55 is passed in assembling the parts.

The electrical connections are as follows: From the positive binding-post 5, connection is made to the series magnets 11, the shunt magnets 12 and the resistance coil 31; from the series magnets, wire 57 leads to a screw 60 extending through the slot in the carbon tube 1 and into a holder for the upper electrode; from the lower electrode the current flows up through rod 52 and by wire 58

to the negative binding-post 5′; from the shunt magnet, wire 59 leads to the negative return wire 58; and the resistance coil 31 is connected to one contact 30 of the cut-out switch, the other contact of which is connected by wire 32 with the negative return wire 58.

What we claim as new and desire to secure by Letters Patent of the United States, is,

1. In an arc lamp, a movable electrode, a clutch arranged to engage the electrode, operating devices for moving the clutch back and forth to position the electrode, a clutch-stop above the clutch, and arms integral with said stop depending therefrom on either side of the clutch jaw near its pivotal point to prevent lateral movement thereof.

2. In an arc lamp, a gas-cap having a gas-passage therethrough, and a plurality of openings from the under side of the cap to the passage, said openings being threaded to receive screws whereby entrance to the gas-passage may be partially or entirely closed.

3. As an article of manufacture, a clutch for use in an arc lamp, consisting of a yoke and a jaw pivoted thereto, said jaw having a body portion and wings bent at right angles to the body portion and provided with holes for pivotally connecting the jaw to the yoke of the clutch and to the clutch-connecting rod.

4. As an article of manufacture, a clutch for use in an arc lamp, consisting of a yoke, and a jaw pivoted thereto, said jaw having a body portion and wings bent at right angles to the body portion, and having a tongue adapted to be bent around in proximity to the body portion to form an engaging tooth.

5. An electric arc lamp having an arc-inclosing bulb communicating with the air through an elongated passage, and means for adjusting the effective length of said passage.

6. In an electric arc lamp, the combination of an arc-inclosing bulb, a cap closing the end of said bulb having an opening through which the movable electrode slides, the interior of said bulb being in communication with the outer air through an elongated passage, and means coöperating with said passage to vary the effective length thereof.

In witness whereof, we have hereunto set our hands this ninth day of February, 1904.

JAMES A. DALZELL.
CHARLES E. HARTHAN.

Witnesses:
DUGALD McK. McKILLOP,
JOHN A. McMANUS.