(No Model.)

H. H. BIGLAND & J. BURNS.

ELECTRIC ARC LAMP.

No. 482,568. Patented Sept. 13, 1892.

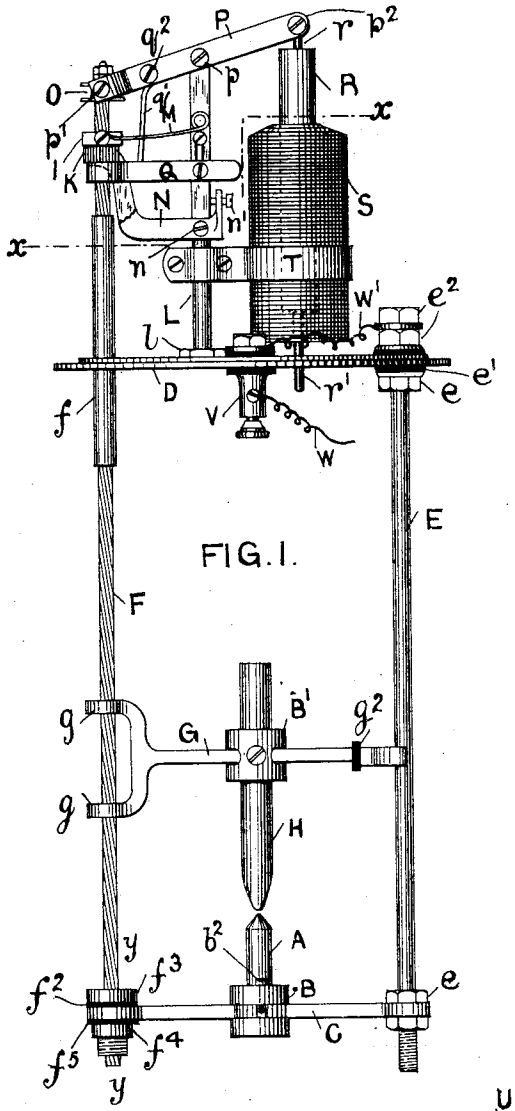


FIG. 1.

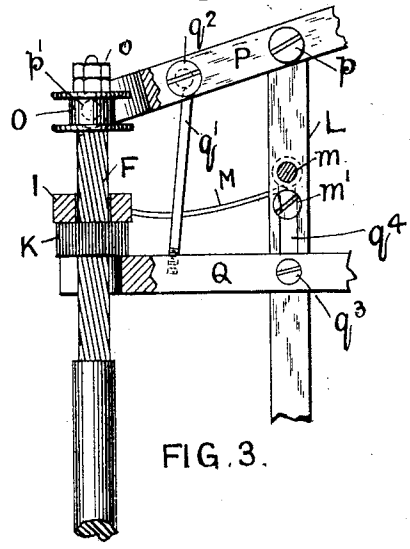
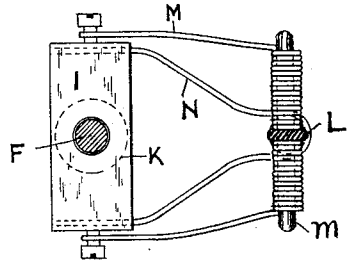


FIG. 3.

FIG. 4.



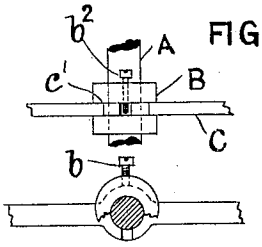


FIG. 5.

FIG. 6.

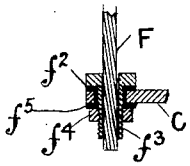
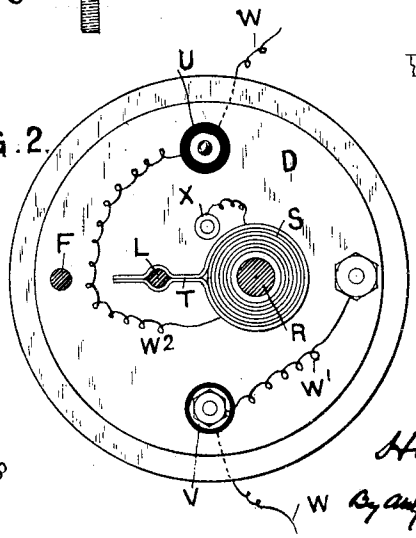


FIG. 7.

FIG. 2.



Witnesses
Stephen Jammes
R. F. Wallis

Inventors
Hubert H. Bigland.
John Burns.
By their Atty's Frankland Jammes.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HUBERT H. BIGLAND AND JOHN BURNS, OF NEWCASTLE-ON-TYNE, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 482,568, dated September 13, 1892.

Application filed April 20, 1892. Serial No. 429,859. (No model.)

To all whom it may concern:

Be it known that we, HUBERT HALLAM BIGLAND, electrical engineer, and JOHN BURNS, brass-finisher, subjects of the Queen of Great Britain, residing at Newcastle-on-Tyne, in the county of Northumberland, in the Kingdom of England, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention has for its object an electric-arc lamp which shall be simpler, more compact, have fewer parts, and get into less space than those now in use, and which will be cheaper and work in as steady a manner.

Referring to the drawings, Figure 1 is an elevation of the entire lamp; Fig. 2, a sectional view through line X X of Fig. 1; Fig. 3, an enlarged view, partly in section, of the feed mechanism; Fig. 4, a plan of springs, upper friction-plate, and contiguous parts; Figs. 5 and 6, an elevation and a plan, partly in section, of carbon-holder; Fig. 7, a section through *y y*.

A is the lower carbon; B, the holder carrying the same; C, cross-bar carrying the holder B.

D is the main plate; E, an insulated supporting brass rod carried on the main plate D and fixed thereto by nuts *e* on insulated washers and sleeves *e'*, as shown. Cross-bar C is supported by and in electrical contact with the rod E, and is held rigid thereto by nuts *e*.

F is a thoral or twist rod having a bush f soldered thereto and passing through the main plate and in electrical contact therewith. This twist-rod F rotates freely in, but is electrically insulated from, the cross-bar C by means of insulating-sleeves f^2 and f^3. The screw-bush f^3 is screwed up tight by nut f^4, which latter is again insulated from the cross-head by insulating-washer f^5. The thoral or twist rod can revolve and slide freely in the insulated sleeve f^2.

A cross-bar G, sliding freely on the supporting-rod E, engages by threads in its bearings *g g* with the rod F, the two bearings *g g* forming nuts for the said twist-rod. This cross-bar G is insulated from bar E at g^2 and carries the upper carbon H in the holder B'.

The arrangement of holders is peculiar and is illustrated in Figs. 5 and 6. In these A is the carbon; B, the holder; C, the cross-head. This cross-head passes into B through a horizontal slot *c'*. The set-screw *b* in the holder B is pressed against the cross-head C. This forces the cross-head against the carbon on one side and presses the carbon against the bearings of holder B on the other side. In Fig. 1 both sides of the holder B are shown, one in connection with the upper carbon H and the other in connection with the lower carbon A. In order to prevent the holder B from being lost, set-screw b^2 is passed through its upper portion, entering the small slot or recess in holder C. I is a stout plate sliding freely on rod F and pressed down by springs M, carried on pedestal L, by means of cross-bar *m*, their terminals at this end being secured by passing around pin *m'*. Springs M have a constant tendency to press the plate I downward. K is a nut working on rod F. Plate I is, however, prevented from being pressed down on nut K when the lamp is not in use, which would prevent the carbons from running together, and consequently prevent a current from passing through the carbons and solenoid on starting by means of support N, carried pivotally on standard L by means of set-screw *n* and regulated as regards its exact height by another set-screw *n'*. L is a stout pedestal supported on main plate D and firmly fixed thereto by nuts *l l*. O is a bobbin having a flange top and bottom and running loosely on a turned-down portion of rod F. *o* are two nuts screwed onto a still further turned-down portion of twist-rod F, holding bobbin O in place, but allowing it freedom to turn with little friction on twist-rod F. P is a lever preferably in two parts fastened together and supported pivotally on standard L by pivot *p*. *p'* are two set-screws or pins in the jaw of lever P, fitting loosely between the flanges of bobbin O. Q is a plate supported by rod *q'*, attached to a screw q^2 in lever P at one end and screwed into plate Q at the other end. This plate Q is cut away to form two jaws round the twist-rod F, the said jaws supporting the nut K. q^3 is a screw working in slot q^4 in standard L. R is a cylindrical iron core having a wire continuation at each end, the one *r* hooked or linked onto

a pivot p^2 at the end of lever P, the other r' passing through the base-plate D. S is a solenoid supported on pedestal L by means of clamp-plate T. U V are two terminal screws; W, the wires leading from the dynamo. The current from the dynamo passes from the terminal U through the wire W^2 to the solenoid S and through the latter to the set-screw X in base-plate D. The current passes through the base-plate D down the thoral F to the cross-bar G, through the latter and holder B′ to the upper carbon, thence to the lower carbon A, forming an arc, and from there through holder B, cross-head C, supporting-rod E, to wire W′, thence to the terminal V, and back to the dynamo by wire W. The wire W′ is electrically connected with the rod E by being clamped between the two screws e^2 e^2 upon the same.

The mode of action is as follows: The lamp not being in use, the weight of the upper carbon H, the holder B′, and the cross-head G causes these to fall, the friction being off nut K, owing to the friction-plate I resting on support N. By this action the two carbons touch, the twist-rod turning round sufficiently to allow this. The moment, however, that the current is turned on, the solenoid S pulls down the core R and with it the lever P. This raises the twist-rod F, the plate Q, the nut K, and the plate I against the force of the springs M and the cross-head G and the carbon B, thus striking the arc. The point p' being, however, farther from the fulcrum p than is the pivot q^2, the twist-rod F rises more than the rod q', and consequently than the plate Q. The nut, being held tight between the plates I and Q, cannot turn. Consequently the rod F turns in it and also in its threaded bearing g. This has a contrary effect to the raising of F on the cross-piece G, and the latter does not rise as much as the rod F does, but only about as much as the plate Q rises, but sufficient to strike the arc. As the operation of the arc wastes the carbons away the current in the solenoid S decreases, owing to the resistance being increased. The core R accordingly rises, and the rod F with the plate I, nut K, plate Q, cross-head G, and carbon H fall in like proportion by their weight pulling the twist-rod F down. The pulling of the twist-rod threads F through the nut K tends to raise the nut K. The nut K, however, cannot rise, being prevented by the pressure of springs M on plate I against the nut K. The nut K is therefore obliged to rotate, which it does freely. Not only is the grip released by the tendency of nut K to rise on twist-rod F, but also by the lever P pressing plate Q down away from nut K. This falling, however, increases the current in the solenoid S, causing the core R to be drawn down. The rod F at once rises, carrying with it plate Q and plate I and the nut K, and the nut K is again jammed between plates I and Q. Any further rise, therefore, of the rod F is through the stationary nut K. Consequently the rod has to turn, and, turning in the bearings of cross-bar G in exact proportion as it rises, the said cross-bar remains stationary and the cycle of operations already described is again renewed. In the ordinary laminated core with an ordinary suitable coil, instead of the solid core R and solenoid S, this lamp can be run on an alternating current. With the ordinary differential winding of the solenoid S it can also be run in series.

We claim as our invention—

1. An arc lamp having a twist-rod, a movable carbon-holder controlled thereby, means for lifting said twist-rod and holder simultaneously, and means for imparting a rotary motion to the twist-rod at a determinate point of its lift, as and for the purpose set forth.

2. An arc lamp having a twist-rod, a movable carbon-holder supported thereon by fixed threads engaging the thread on the twist-rod, means for lifting the twist-rod and holder simultaneously, and means for imparting to the twist-rod a rotary motion at a determinate point of its lift, whereby the pitch of the threads will offset the rise in the twist-rod and keep the carbon-holder in a stationary position.

3. A feed mechanism for arc lamps, comprising a twist-rod having a loose nut and carbon-holder threaded thereon, means for lifting the twist-rod, carbon-holder, and nut simultaneously, and means for retarding and holding the nut at a determinate point in the lift, thereby rotating the twist-rod in a direction opposing the further rise of the carbon-holder.

4. A feed mechanism for arc lamps, comprising a twist-rod, a loose nut and a carbon-holder threaded thereon, an electro-magnet, and connections between the electro-magnet and twist-rod, whereby the latter is raised against the force of gravity, and means for jamming the nut at a determinate point in the lift of the rod, thereby compelling the twist-rod to rotate in the nut and carbon-holder on its further lift and preventing the further rise of the carbon-holder.

5. The combination of the solenoid S, core R, lever P, twist-rod F, upper-carbon-supporting cross-bar G and loose nut K upon the twist-rod, and means whereby when the current is passed through the solenoid S the nut K shall first rise freely with the twist-rod F and there be jammed, whereby the twist-rod F first rises without turning, lifting the carbon-holder and striking the arc, and then rises and turns in the nut K and also in the holder G, leaving said holder stationary after the twist-rod turns.

6. The combination of the solenoid S, the core R, the oscillating lever P, the pivots p, the bobbin O, the twist-rod F, and cross-bar G, substantially as and for the purposes described.

7. The combination of the lever P, twist-rod

F, friction-plate I, nut K, suspension-rod q', plate Q, and support N, substantially as and for the purposes described.

8. The combination of the lever P, movable plate Q, suspended therefrom, nut K, twist-rod F, support N, friction-plate I, and springs M, substantially as described.

9. The combination of the lever P, carrying the arc-striking mechanism, suspension-rod q', plate Q, and sliding bearing q^3, substantially as described.

10. The regulated support N, pivoted at n and having a regulated screw n', and plate I, arrested by said support, substantially as and for the purposes described.

11. The combination of the friction-plate I, a device M for pressing the same down, support N, lever P, core R, and solenoid S, in combination with the plate Q, rod q', arresting device q^3 and q^4, nut K, and twist-rod F, whereby as the weight of the twist-rod F and its appurtenances draws the core R up the nut K shall be relieved from the pressure friction-bar a trifle before the plate Q strikes the bottom of slot q^4 and arrests the downward course of F and its appurtenances by jamming.

12. The combination of the solenoid S, supported upon standard L by clamp-plate T, core R, oscillating lever P, pivot p^2, with the plate D, and the guide r', whereby the core is kept nearly central in the solenoid S, for the purposes described.

13. The combination of the carbon-carrier B, the supporting-plate C, passing through a slot in the holder B, the carbon A, passing through a hole in plate C and in holder B, and the set-screw b, whereby the carbon A is tightly held on one side by the holder B and on the other side by the plate C.

14. The combination of the plate C, carbon-holder B, and set-screw b, substantially as described.

15. The combination of the twist-rod F, loosely-fitting metallic sleeve f^3, washer and sleeve f^2, and washer f^5, and the nut f^4, whereby the twist-rod F has a bearing in plate C, while free to rise up and down, and is entirely insulated from the plate C.

16. The combination of the carbons A and H with holder B′, carried on cross-piece G, supported on a twist-rod F, said twist-rod F being capable of both a twisting motion in its nuts g and of a vertical rise-and-fall motion in the mechanism for adjusting the position of the carbon in an arc lamp.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

H. H. BIGLAND.
J. BURNS.

Witnesses:
THOMAS DANE,
Ashfield Terrace, West, Newcastle-upon-Tyne, Clerk.
PERCY CORDER,
Newcastle-upon-Tyne, England, Solicitor and Notary Public.