Oct. 13, 1959 H. GREBER 2,908,841

GAS DISCHARGE LAMP

Filed May 19, 1958

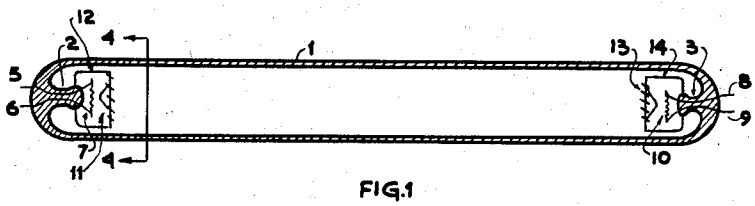


FIG.1

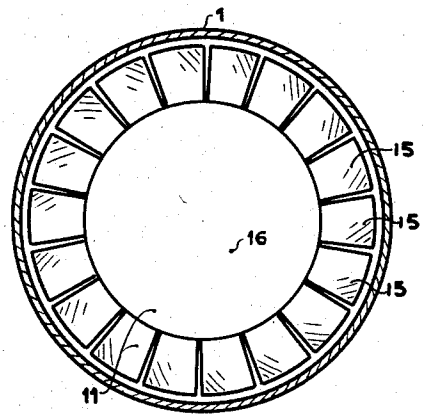


FIG.2

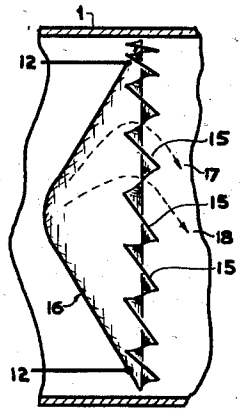


FIG.3

INVENTOR.

Henry Greber

United States Patent Office

2,908,841

Patented Oct. 13, 1959

2,908,841

GAS DISCHARGE LAMP

Henry Greber, New York, N.Y.

Application May 19, 1958, Serial No. 736,038

3 Claims. (Cl. 313—204)

The purpose of this is to increase the efficiency of gas discharge lamps by applying to them shields directing the electrons emanating from the filaments to regions close to the walls of said lamps and imparting to said electrons a velocity component perpendicular to the longitudinal axes of said tubes. This velocity component added geometrically to the velocity component parallel to the longitudinal axis causes the emanated electrons to pursue a helical path, which is essentially longer, and gives more chance for their collision with gas molecules than does a rectilinear path. The purpose of keeping the electron paths near the wall of the tube is to prevent the excessive absorbtion of light produced by them by the volume of gas near the axis of the tube.

Fig. 1 shows a view of the gas discharge tube incorporating this improvement. Fig. 2 presents an enlarged cross section 4—4 of said tube. In Fig. 3 can be seen a side elevation of the grid, whose front view is shown in Fig. 2.

In Fig. 1 transparent tube 1 contains two stems 2 and 3. Stem 2 comprises lead wires 5 and 6, connected to filament 7, and stem 3 comprises lead wires 8 and 9 connected to filament 10. In front of said filament 7 is mounted grid 11 which has the form of a shield and is supported from stem 2 by means of wires 12. Similarly shield 13, supported on wires 14, is mounted in front of filament 10. The design of shield-shaped grid 11 is shown in Fig. 2, which is the cross sectional view 4—4 indicated in Fig. 1. It can be seen in Fig. 2 that shield 11 comprises bulged hub 16 and a plurality of blades 15, which resemble blades of a fan. Fig. 3 is a side view of shield 11 and shows that hub 16 is convex in direction of filament 7 and that blades 15 are inclined towards the longitudinal axis of the tube. Numerals 17, 18 show electron paths.

In operation of this gas discharge tube electrons emitted by the filaments, at the start of the lamp, hit the shield and bring it to a negative potential, so that it acts repulsively on the further flow of electron. Therefore electrons emanating from the filament go along paths parallel to the bulge 16 and through the spaces between the blades 15. Since these blades are slanted towards the longitudinal axis of the tube, the electrons, following the slant of these blades receive a transversal

component of velocity, which geometrically added to their longitudinal velocity, causes them to pursue helical paths. Pursuing such paths the electrons are subject to a centrifugal force which pushes them towards the wall of the tube, so that they collide with gas molecules near said wall. Since the helical path is longer than the rectilinear, the electrons have a larger probability to collide with gas molecules. Were these collisions to take place in the central regions of the tube, the produced light would be partly re-absorbed by the relatively thick layer of gas in these regions. This cannot take place when collisions occur near the wall of the tube.

This improvement can be applied to fluorescent, mercury sodium, and other kinds of gas discharge lamps, such as neonsign lamps, and glow lamps. It is to be understood that the here described lamp is only illustrative, and many variations and modifications of it can be made within the scope of the following claims.

I claim:

1. A gas discharge lamp having at least one cathode enclosed in a gas filled, insulating and transparent envelope, with at least one lead wire passing said envelope and connecting said cathode with a source of electrical energy, also having a metallic shield mounted in front of said cathode and provided with blades slanted in respect to the longtiudinal axis of said tube, said shield serving for directing electrons emanating from said cathode towards the wall of the envelope and for imparting to said electrons a rotatary motion around the longitudinal axis of the lamp.

2. A gas discharge lamp having: two filaments enclosed in a gas filled, insulating and transparent envelope with lead wires passing said envelope and connecting said filament to a source of electric energy, metallic shields mounted in front of said filaments and provided with blades slanted towards the longitudinal axis of said lamp, said shields serving for directing electrons emanating from said filament towards the wall of the envelope and imparting to said electrons a rotatory motion around the longitudinal axis of said tube.

3. A gas discharge lamp having: two filaments enclosed in a gas filled, insulating and transparent envelope with lead wires passing said envelope and connecting said filament to a source of electric energy, a shield made of glass mounted in front of at least one of said filaments and provided with blades slanted towards the longitudinal axis of said lamp, said shield serving for directing electrons emanating from said filament towards the wall of the envelope and imparting to said electrons a rotary motion around the longitudinal axis of said tube.

References Cited in the file of this patent

UNITED STATES PATENTS

2,210,689	Siemens	Aug. 6, 1940
2,429,118	Besser	Oct. 14, 1947
2,479,853	Meunier	Aug. 23, 1949
2,530,990	Peters	Nov. 21, 1950
2,692,350	Arnott	Oct. 19, 1954