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DISCHARGE TUBE

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10 Claims. (Cl. 176—122)

This invention relates to discharge tubes, which term is understood to include both tubes of that type in which discharges take place between electrodes linked up with a high tension, and after ionization cause the filling to light, as well as tubes in which a so-called basic gas is ionized by means of a hot cathode, metallic vapors thus being induced to radiate.

In discharge tubes of the kind first referred to molecular gases have already been employed in the form of carbon monoxide and carbondioxide for producing pure white light very closely approaching daylight. The uses of these tubes, however, are extremely limited, since despite the greatest care in the selection of the electrodes the filling gradually becomes absorbed. Allowance, therefore, must always be made for subsequent refilling of the tube with gas. The means necessary in this connection increase the cost of the plant, and cannot be fitted in all cases.

Now it has been found that perfectly white light similar to daylight may be obtained if in place of the molecular gases CO or CO_2 hitherto employed gases are selected which are formed by metal vapors bound co-ordinately with organic traces. Examples of these are the carbonyls of iron $Fe(CO)_4$, $Fe(CO)_5$, of molybdenum $Mo(CO)_N$ and of nickel $Ni(CO)_4$. It has been found that tubes having the above fillings do not suffer in any way from the effects of decomposition or absorption. This excellent behaviour of metal carbonyls in discharge tubes is due to the fact that the temperatures for formation and decomposition of these gases are situated very close together. If, therefore, in the case of high load moderate heating occurs at the electrodes, there is formed for example at these points finely distributed metallic nickel which, however, immediately residual traces of carbon monoxide from the cold positive column enter into contact with this deposited metal, again forms metal carbonyl and thus initiates a regeneration of the tube filling.

The use of these metal carbonyls is confined to a certain gas pressure within the tube. This gas pressure varies according to the boiling point of the compound. In the case of nickel carbonyl a partial pressure of approximately 1.5 mm. Hg is very suitable.

In the case of ferro-carbonyl and molybdenum carbonyl the ignition potential may be considerably reduced as compared with nickel carbonyl. The life of the luminous tube is, however, adversely affected thereby.

The filling does not require to contain one of the stated metal carbonyls alone. The carbonyls above referred to may also be employed in mixture. It is also possible to employ for part of the filling other gases than those hitherto in use. Upon lighting the white color of the light is not changed so long as the partial pressure is maintained which is peculiar to each carbonyl. The presence of mercury does also not interfere with the pure white color of the light.

What I claim as new and desire to secure by Letters Patent is:

1. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling which consists at least in part of metal vapors bound with organic radicles.

2. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling consisting solely of a metal carbonyl.

3. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling which consists of nickel carbonyl under a pressure of 1.5 mm. of mercury.

4. A discharge tube having a filling which consists of nickel carbonyl and rare gases.

5. A discharge tube having a filling which consists of nickel carbonyl and mercury.

6. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling which consists of a carbonyl of a metal selected from the group consisting of iron, nickel and molybdenum.

7. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling which consists of ferro-carbonyl.

8. A discharge tube of the type that ionizes a basic gas by a heated cathode having a filling which consists of molybdenum carbonyl.

9. A discharge tube of the type that ionizes a basic gas by a heated cathode, comprising, in combination, an evacuated glass bulb, at least two electrodes sealed into the said bulb and separated by a gap, and a permanent filling of at least one metal carbonyl vapor.

10. A discharge tube of the type that ionizes a basic gas by a heated cathode, comprising, in combination, an evacuated glass bulb, and a permanent filling of nickel carbonyl at a pressure of approximately 1.5 millimeters of mercury.

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