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⑰ **Improvements in photoprinting lamps.**

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US-A-4 197 480

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**The file contains technical information
submitted after the application was filed and
not included in this specification**

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Description

This invention relates to discharge lamps, primarily but not exclusively for the photoprinting industry. In the photoprinting industry there is a requirement to expose diazo and photopolymer printing plates, which are then used to transfer ink to the printing paper. The former (diazo) requires a lamp having a spectral energy distribution which peaks at approximately 420 nm while the latter material requires a lamp having a spectral energy distribution peaking at approximately 380 nm. At the present time these different requirements are met by two different lamps each with a fill designed to produce radiation of the desired wavelength. For example a lamp with a fill of 1.3 mg of gallium tri iodide would be used for diazo prints while a lamp with a fill of 2.5 mg of iron iodide would be used for the polymer material, each lamp of course would have the necessary fill of mercury. Metal halide lamps having in addition to mercury, a mixture of gallium and ferric iodide are disclosed in the article "A metal halide lamp using both gallium and ferric iodides" by Shunji Kondoh, Lighting Research Laboratory, Lamp and Lighting Division, Storage Battery Co., Kyoto, Japan. The lamps disclosed therein are restricted to linear tubular lamps of 1000—5000 watts and arc lengths of between 98 to 200 mm. These lamps require some kind of cooling system because of the heat generated.

In its broadest aspect the present invention embraces a discharge arc tube having a basic fill of mercury plus between 0.025 to 1.0 mg GaI_3 per cm^3 of the arc tube volume and between 0.1 to 1.0 mg of FeI_2 per cm^3 of the arc tube volume.

According to one aspect of the present invention there is provided an arc tube of quartz material suitable for a sealed beam reflector photoprinting lamp, the arc tube including spaced electrodes to sustain a discharge therebetween and a fill comprising

from 0.025 to 1.0 mg GaI_3 per cm^3 of the arc tube volume,
from 0.1 to 1.0 mg FeI_2 per cm^3 of the arc tube volume, and
from 2.5 to 6.5 mg Hg per cm^3 of the arc tube volume.

According to another aspect of the present invention there is provided a sealed beam reflector lamp for photoprinting, the lamp comprising, in combination, a reflector including a dichroic or aluminised layer selected to reflect ultra violet radiation and an arc tube of quartz material, the arc tube including spaced electrodes to sustain a discharge therebetween and a fill comprising

from 0.025 to 1.0 mg GaI_3 per cm^3 of the arc tube volume,
from 0.1 to 1.0 mg FeI_2 per cm^3 of the arc tube volume, and
from 2.5 to 6.5 mg Hg per cm^3 of the arc tube volume.

By providing the outer jacket with a dichroic layer on the inner rear surface thereof and positioning the discharge arc tube near the focus of the reflector, radiation can be diffused through the prismatic window at the front of the reflector and a substantially uniform directionally controlled beam of light is produced. In addition the dichroic layer reflects UV radiation and provides for heat dispersal. Also, the glass outer jacket affords a high degree of protection from short wave UV radiation. The geometry of the discharge arc tube with an electrode length of approximately 25 mm or less and a diameter of 26 mm allows a high wall loading and a hot restart facility. If a hot re-start facility is not required then an aluminised reflector may be substituted for the dichroic layer. This feature combined with a fast run up facility avoids the need to simmer at a reduced power thus achieving reduced running costs when compared with conventional linear sources for photoprinting.

The invention will now be described by way of example only and with reference to the accompanying drawings wherein:

Figure 1 shows the combination of a discharge arc tube and sealed beam reflector according to one aspect of the present invention,

Figure 2 shows in more detail a discharge arc tube according to a further aspect of the present invention, and

Figure 3 shows a graph of irradiance against total iodide dose in accordance with the present invention.

In Figure 1, the reference numeral 10 denotes generally a 800 watt sealed beam reflector lamp combination according to the present invention comprising a reflector 11 containing a metal halide quartz discharge arc tube 12.

A prismatic lens 13 is sealed to the reflector 11 providing a front window and a dichroic layer 14 is formed on the rear inner surface of the reflector 11. The dichroic layer is selected to reflect UV rather than visible light.

The discharge arc tube 12 is shown in more detail in Figure 2. The discharge arc tube 12 is disposed adjacent the focus of the reflector 11 and is carried on nickel alloy inner lead in members 15 and 16 joined to outer lead in members 17 and 18 formed of copper braid. A ceramic bridge member 19 maintains the electrically conducting pins 20 and 21 at the correct spacing. This is a standard G38 bi-pin construction providing a hot restart facility.

In Figure 2 the discharge arc tube 12 is shown in more detail. It is seen to comprise a quartz envelope 22 of approximately 10 cm^3 internal volume having a fill 23 selected from a mixture of iron iodide (FeI_2), Gallium Tri iodide (GaI_3) and mercury (Hg). Tungsten electrode coils 24, 25 are carried on tungsten shanks 26, 27 which are joined respectively to inner molybdenum foils 28 and 29. Outer molybdenum lead-in

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members 30, 31 are also joined to the foils 28, 29 and hermetically sealed in the pinches 32, 33. A typical electrode length between the electrodes 24 and 25 would be 25 mm with an overall length over the pinch seals of 78 mm while the maximum envelope nominal diameter would be 26 mm. Such an arc tube 12 would then be suitable for a metal halide discharge lamp.

⁵ In Figure 3 there is shown a graph of a FeI_2 — GaI_3 —Hg system according to the invention which indicates a peak irradiance at the particular total iodide dose of 2.5 mg FeI_2 +0.5 mg GaI_3 +50 mg Hg in an approximately 10 cm³ volume arc tube. Other values of relative irradiance at difference dosage rates are given in the following Tables 1 and 2 where all values refer to arc tubes of approximately 10 cm³ volume.

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TABLE 1

Example	FeI_2	GaI_3	Hg	Relative ave irr (no units)
1	2.5	0.25	50	22.8
2	2.5	0.5	50	24.9
3	2.5	1.0	50	22.1
4	2.5	2.0	50	20.8
5	2.5	5.0	50	14.1
6	2.5	10	50	11.7

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TABLE 2

Example	FeI_2	GaI_3	Hg	Irr
1	1.0	1.2	45	19.99
2	1.5	1.2	43	18.02
3	2.5	1.2	40	19.63
4	4.0	1.2	37	18.12
5	5.0	1.2	35	16.02
6	7.5	1.2	30	12.53
7	10	1.2	25	10.33

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In Table 2 the mercury content had to be varied in order to achieve the correct volt drop. In all the tests the UV · A and effective response was measured using a "Macam" UV radiometer on a screen positioned 1.0 metre from the source. Readings were taken on a screen 75 cm×50 cm (30"×20") and converted to average W/M² values.

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In further tests lamps having arc tubes of approximately 10 cm³ volume with a fill of 2.5 mg FeI_2 plus 0.5 mg GaI_3 and 65 mg Hg instead of 50 mg were tested and found to have an average irradiance of between 46.2 and 48.5 W/M².

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Further ranges of fills suitable for approximately 10 cm³ arc tubes comprise a) 0.5 to 0.55 mg GaI_3 plus 2.45 to 2.65 mg FeI_2 and 60 to 65 mg Hg and b) 0.5 mg GaI_3 plus 2.5 mg FeI_2 and a quantity of mercury selected from between 50 to 65 mg.

The examples set out hereinbefore are examples of lamps with arc tubes having specific fills, however, it will be clear to the man skilled in the art that variations in the fills and arc tube size could be made. In general the invention can be utilised in a range of fills comprising

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- 0.025 to 1.0 mg GaI_3 per cm³ of arc tube volume
- 0.1 to 1.0 mg FeI_2 per cm³ of arc tube volume
- 2.5 to 6.5 mg per cm³ of arc tube volume.

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Claims

1. An arc tube of quartz material suitable for a sealed beam reflector photoprinting lamp, the arc tube including spaced electrodes to sustain a discharge therebetween and a fill comprising
 5 from 0.025 to 1.0 mg GaI_3 per cm^3 of the arc tube volume, from 0.1 to 1.0 mg FeI_2 per cm^3 of the arc tube volume, and from 2.5 to 6.5 mg Hg per cm^3 of the arc tube volume.
2. An arc tube according to Claim 1 wherein the fill comprises 0.5 to 0.55 mg GaI_3 plus 2.45 to 2.65 mg FeI_2 plus 60 to 65 mg Hg and the arc tube has an internal volume of substantially 10 cm^3 .
- 10 3. An arc tube according to Claim 1 wherein the fill comprises 0.5 mg GaI_3 plus 2.5 mg FeI_2 and 50 to 65 mg of Hg, the arc tube having an internal volume of substantially 10 cm^3 .
4. An arc tube according to Claim 3 wherein the mercury content is 50 mg.
5. An arc tube according to any preceding Claim wherein the distance between the electrodes is substantially 25 mm or less and the arc tube internal diameter is 26 mm.
- 15 6. A sealed beam reflector lamp for photoprinting, the lamp comprising, in combination, a reflector including a dichroic or aluminised layer selected to reflect ultra violet radiation and an arc tube according to any one of Claims 1 to 5.
7. A sealed beam reflector lamp according to Claim 6 wherein said arc tube is positioned adjacent to the primary focus of the reflector.
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Patentsprüche

1. Bogenentladungsröhre aus Quarzmaterial, die für eine Reflektor-Fotodrucklampe mit gerichteter
 25 Strahlung geeignet ist, wobei die Bogenentladungsröhre im Abstand von einander angeordnete Elektroden einschließt, um zwischen diesen eine Ladung aufrechtzuerhalten, und eine Füllung, die umfaßt zwischen 0.025 bis 1.0 mg GaI_3 pro cm^3 des Bogenentladungsröhre-Volumens, zwischen 0.1 bis 1.0 mg FeI_2 pro cm^3 des Bogenentladungsröhren-Volumens, und zwischen 2.5 bis 6.5 mg Hg pro cm^3 des Bogenentladungsröhren-Volumens.
- 30 2. Bogenentladungsröhre nach Anspruch 1, bei der die Füllung 0.5 bis 0.55 mg GaI_3 plus 2.45 bis 2.65 mg FeI_2 plus 60 bis 65 mg Hg umfaßt und die Bogenentladungsröhre ein inneres Volumen von etwa 10 cm^3 hat.
3. Bogenentladungsröhre nach Anspruch 1, bei der die Füllung 0.5 mg GaI_3 plus 2.5 mg FeI_2 und 50 bis 65 mg an Hg umfaßt und die Bogenentladungsröhre ein inneres Volumen von etwa 10 cm^3 hat.
- 35 4. Bogenentladungsröhre nach Anspruch 3, bei der der Quecksilbergehalt 50 mg ist.
5. Bogenentladungsröhre nach einem der vorhergehenden Ansprüche, bei der der Abstand zwischen den Elektroden etwa 25 mm oder weniger und der innere Durchmesser der Bogenentladungsröhre 26 mm ist.
6. Reflektorlampe mit gerichteter Strahlung für fotografischen Druck, wobei die Lampe in Kombination
 40 einen Reflektor mit einer dichroitischen oder aluminisierten Schicht, die ausgewählt ist, um ultraviolette Strahlung zu reflektieren und eine Bogenentladungsröhre nach einem der Ansprüche 1 bis 5 umfaßt.
7. Reflektorlampe mit gerichteter Strahlung nach Anspruch 6, bei der die genannte Bogenentladungsröhre benachbart dem primären Brennpunkt des Reflektors angeordnet ist.

45 Revendications

1. Un tube à arc en qaurtz pour une lampe scellée de photo-impression à réflecteur de faisceau, le tube à arc comportant des électrodes espacées de manière à entretenir une décharge entre elles et un remplissage comprenant:
 50 de 0,025 à 1,0 mg de GaI_3 par cm^3 de volume du tube à arc, de 0,1 à 1,0 de FeI_2 par cm^3 de volume du tube à arc, et de 2,5 à 6,5 mg de Mg par cm^3 de volume du tube à arc.
2. Un tube à arc selon la revendication 1, dans lequel le remplissage comprend de 0,5 à 0,55 mg de GaI_2 , plus 2,45 à 2,65 mg de FeI_2 , plus 60 à 65 mg de Kg et le tube à arc a un volume intérieur de
 55 sensiblement 10 cm^3 .
3. Un tube à arc selon la revendication 1, dans lequel le remplissage comprend 0,5 mg de GaI_3 , plus 2,5 mg de FeI_2 et de 50 à 65 mg de Mg, le tube à arc ayant un volume intérieur de sensiblement 10 cm^3 .
4. Un tube à arc selon la revendication 3, dans lequel la teneur en mercure est de 50 mg.
5. Un tube à arc selon l'une quelconque des revendications précédentes, dans lequel la distance entre
 60 les électrodes est sensiblement de 25 mm ou moins et le diamètre intérieur du tube à arc est de 26 mm.
6. Une lampe scellée à réflecteur de faisceau pour photo-impression, la lampe comprenant en combinaison un réflecteur comportant une couche dichroïque ou aluminisée sélectionnée pour réfléchir un rayonnement ultraviolet et un tube à arc selon l'une quelconque des revendications 1 à 5.
7. Une lampe scellée à réflecteur de faisceau selon la revendication 6, dans laquelle ledit tube à arc est
 65 placé dans une position adjacente au foyer primaire du réflecteur.

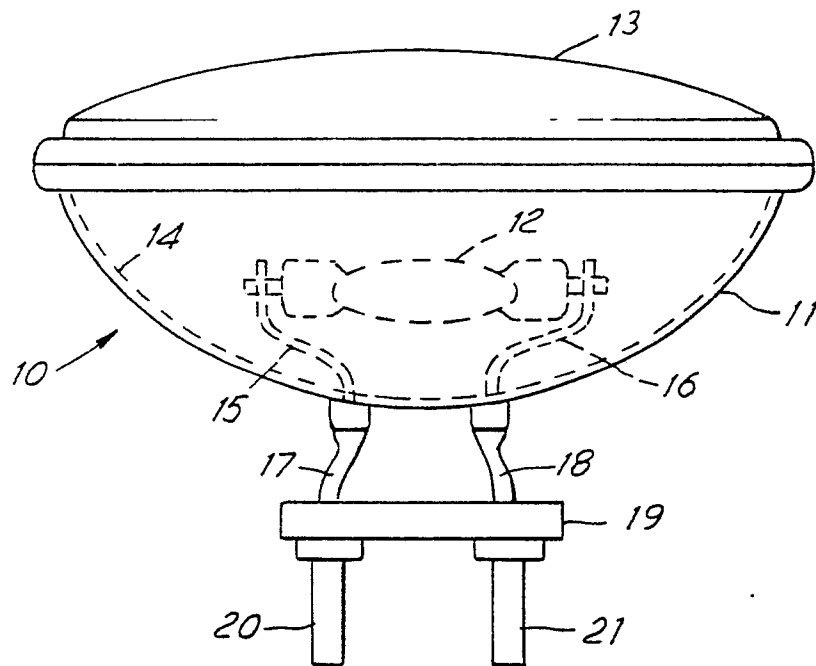


FIG. 1

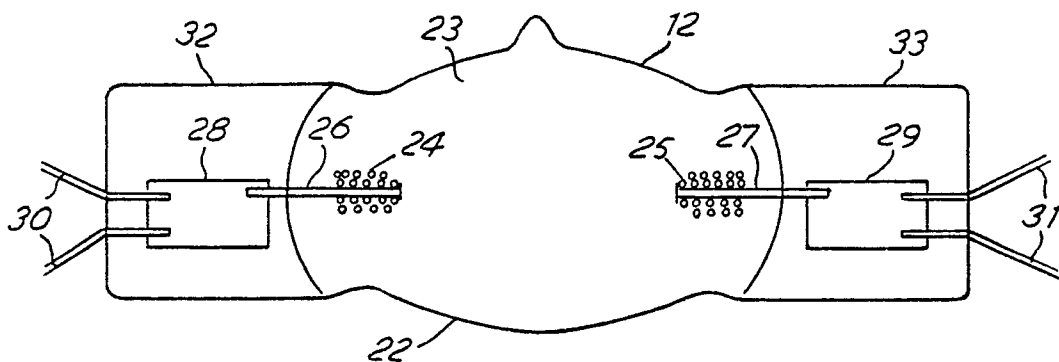


FIG. 2

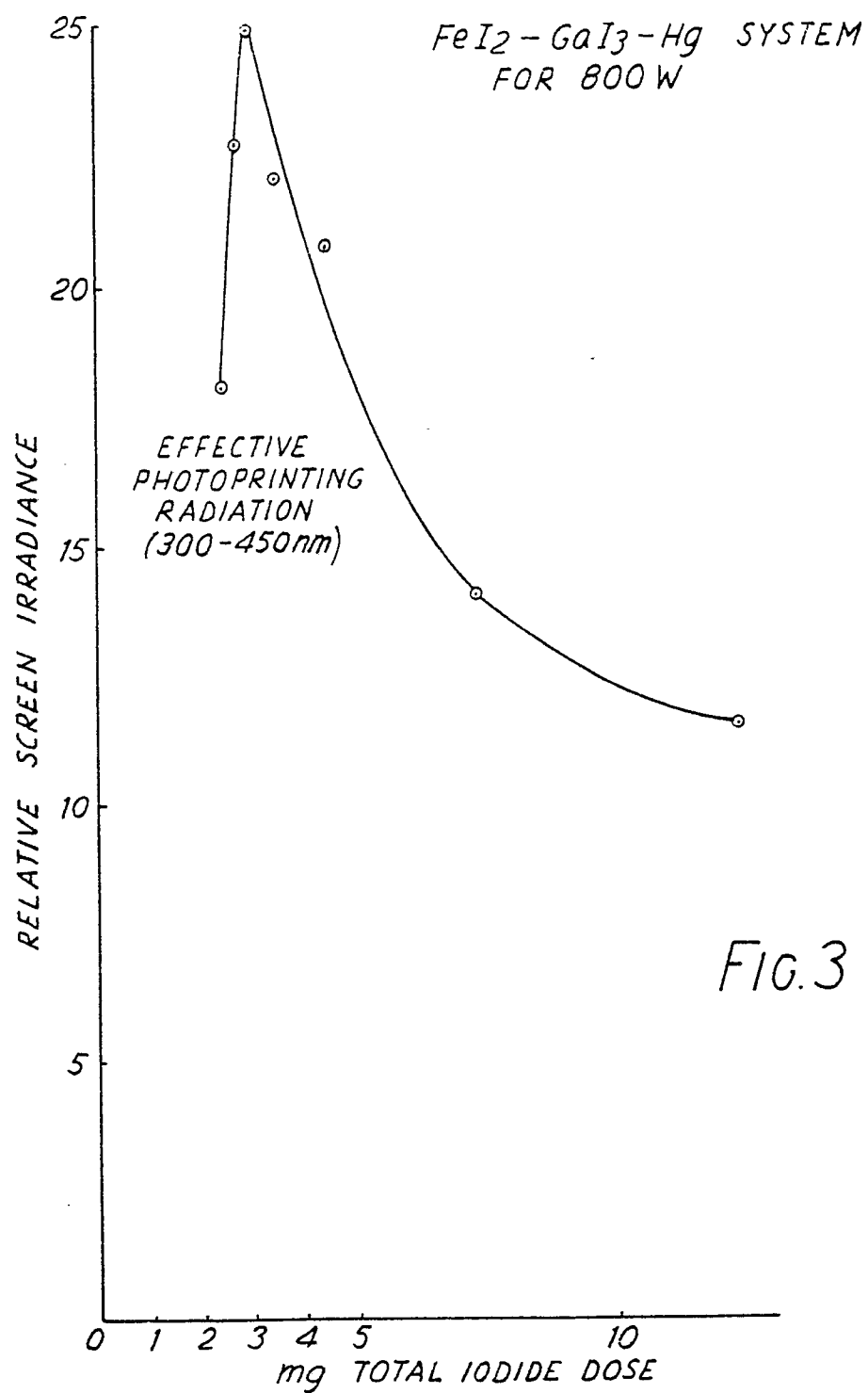


FIG.3