United States Patent [19]

Lange

[11] **3,906,228**

[45] **Sept. 16, 1975**

[54] **X-RAY PHOTOGRAPHIC PROCESS**

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[22] Filed: **Oct. 10, 1973**

[21] Appl. No.: **405,057**

[30] **Foreign Application Priority Data**

Oct. 16, 1972 Germany 2250689

[52] **U.S. Cl.** **250/315**; 96/1.5

[51] **Int. Cl.** **G03g 5/00**

[58] **Field of Search** ..... 96/1.5; 250/315 A

[56] **References Cited**

UNITED STATES PATENTS

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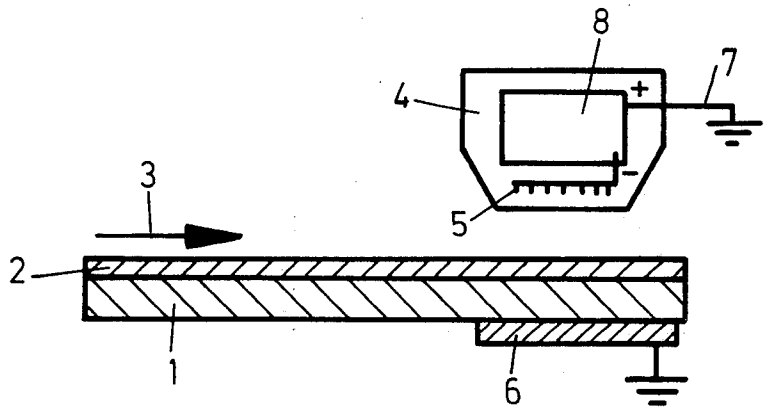
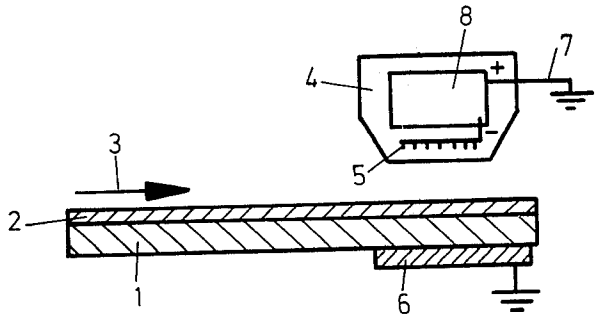
[57] **ABSTRACT**

An electrophotographic X-ray photographic process wherein an electrically conducting plate coated with a selenium layer containing arsenic is charged electrically in a corona discharge arrangement and is then subjected to image forming X-rays. The invention is particularly characterized in that the selenium layer contains 0.01 to 1 atom % arsenic in selenium and that the charging is negative.

1 Claim, 1 Drawing Figure

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X-RAY PHOTOGRAPHIC PROCESS

This invention relates to an X-ray photographic process wherein an electrically conducting plate coated with a selenium layer containing arsenic, is electrically charged in a corona discharge arrangement and is then subjected to image forming X-rays. Then the electrical image which is not visible as yet is made visible by the usual xerographic development. These processes are used since they have a sensitive material which is made sensitive only at the moment of photographing and also because they are quick and inexpensive.

In the known devices of X-ray electrophotography, which is also called xeroradiography, selenium layers are used as photoconducting, i.e., sensitive layers. In the specification to German Patent-Application P 22 50 689.4(DT-AS 1,077,976) is suggested the adding of small amounts of arsenic to these layers to provide greater sensitivity and permanency. However, there is the drawback that after each picture taking, a long time must take place, in comparison to possible taking of picture sequences, until the taken images disappear from the sensitive layer. It is difficult to avoid these effects. It very often happens that earlier taken pictures appear as a background in the later pictures. This disturbance is known by the designation "ghost images".

An object of the present invention is to avoid particularly the appearance of ghost images without increasing the costs.

Other objects will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to use a selenium layer containing **0.01** to **1** atom % arsenic in selenium and to make the charging negative. As compared to known layers which contain **0.5** to about **20** percent by weight, particularly **1** to **10** percent by weight arsenic in selenium, the arrangement of the present invention increases X-ray sensitivity and provides a substantially greater piercing strength, since the application with small amounts of arsenic substantially suppresses the disturbing band conductivity of pure amorphous selenium. This improvement is further increased by the negative charging already at small amounts of arsenic of **0.1** to **0.4%**. At the same time, this provides greater shift passages for the photoelectrically formed charge carriers and thus increases the X-ray sensitivity. Furthermore, the charge storage is substantially improved in negative charging. Relative to the charging position, the dark conductivity is improved by a factor of about **5.** No ghost images appear even when X-ray photographs follow closely one after the other. This is obviously caused by the fact that certain trap levels in the band which in case of pure amorphous selenium are always present in large numbers ($10^{17} - 10^{18}$ cm^{-3}), are filled by arsenic and thus prevent the reception of movable charge carriers. The freeing of charge carriers in the case of pure selenium can take place by heating and then the so-called ghost images will be removed again. However, this heating constitutes an additional operational step and is also detrimental since it changes the structure of selenium.

The present invention can be used with all known xerographic devices. It is merely necessary that the actual sensitive layer be replaced by the layer of the present invention and that the corona charge unit have polarity reversal.

The layer can be made according to all known processes, for example, by steaming the corresponding mixture of selenium and arsenic upon a carrier which due to its electrical conductivity can consist of metal or other conducting material. As is known, various metals, such as aluminum, brass, bronze etc. are useable. Other materials are metallized paper or conductingly made plastic. Instead of metallizing, the treatment can be carried out with a conducting material, such as copper iodide, provided upon an insulating material.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing, the sole FIGURE of which is a diagrammatic sectional view illustrating the subject of the present invention.

The drawing shows a carrier **1** of aluminum having a thickness of **0.5** to **2** mm upon which is steamed a layer **2** of selenium containing **0.3%** arsenic. The thickness of layer **2** amounts to **100** to **500**μ. To set the sensitivity, the combination of the layer **2** and carrier **1** is moved in the direction of the arrow **3** under the corona discharge unit **4** so that a discharge is produced between the comb-shaped electrode **5** and the grounded plate **6** and the surface of the layer **2** is negatively charged. For that purpose, the positive pole of the high voltage source **8** which produces a voltage difference of about **5,500** v., is grounded by the line **7.** The electrode **5** lies at the negative pole.

According to a manufacturing process which is preferred due to the good results it produces selenium containing **0.3%** arsenic heated to **50°C.** is vacuum deposited on an aluminum foil which is **0.5** to **2** mm thick, preferably **1** mm. The deposition is carried out as evaporation which takes place in vacuum 10^{-6} to 10^{-4} torr and with a speed of about **3**μ per minute until the layer has received the required thickness amounting as a rule to **100** to **500**μ.

I claim:

1. A method of imaging with X-rays by exposing to image-carrying X-rays a layer of selenium-arsenic containing **0.01–1** atom percent arsenic, said layer being bonded directly to an electrically conducting plate and negatively charged in a corona discharge device.

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