Candidate's Answer – Paper A (Electricity/Mechanics)

Title: System and Method for transforming light energy into an AC current

The present invention relates to a system according to the preamble of claim 1. The invention further relates to a method according to the preamble of claim 18.

Such a system and method are known from document D1. Therein, a system is disclosed, comprising a mirror which is reciprocately moved between two positions for directing a light beam alternatingly, onto two solar cells. The solar cells are connected to each other for providing an AC current. The system may comprise a transformer for stepping up the generated AC voltage.

In the known system and method, said mirror is moved by a CAM driver by an electromotor. The motor is supplied by a battery.

The advantage of the known system and method is, that they provide for a way to generate AC voltage, from optically transmitted energy. The known system and method are therefore advantageously usable by electrical measurement devices, since the optically transmitted energy is not affected by external electromagnetically radiation.

The disadvantage of the known system is, that it needs a separate battery for powering said electromotor. This makes the known system, and method, rather complex and expensive.

The present invention aims to solve the mentioned problem of the known system. The object of the invention is to provide a system which can operate without a separate battery.

According to the invention, this problem is solved by the characterising portion of claim 1.

Since at least one of the solar cells is connected to said directing means for powering the directing means, no external battery is needed anymore. During use, light is directed onto one of the solar cells. As a result, that solar cell generates a voltage. This voltage is simply used for powering the electrical directing means, so that the light beam is directed onto the other solar cell. Again, this other solar cell will - as a result - produce a voltage which may or may not be used for further powering said directing means.

The present invention further aims to provide a method for transforming light energy into an AC voltage, according to the preamble of claim 18, wherein no external battery is needed. According to the invention this is achieved by the characterising practice of claim 18.

Since said electrical directing means are powered by at least one of said solar cells, no external battery is needed therefore.

As a further advantage, the generation of electrical energy can start automatically when the light beam reaches one of said solar cells at the start of the method. The same holds for the system as provided by the present invention, as characterised by the features of claim 13.

Claims

1. System for transforming light energy into an AC voltage, comprising:

   - a first solar cell (26);
   - a second solar cell (28);
   - electrical directing means (20, 22, 34, 36, 38, 40) for directing a light beam alternatingly onto said first solar cell (26) and second solar cell (28);

   wherein said first and second solar cell (26, 28) are connected for producing said AC voltage, characterised in that at least one of said solar cells (26, 28) is connected to said directing means for powering the directing means.

2. System according to claim 1, wherein said directing means are arranged to make said light beam and said solar cells (26, 28) reciprocately with respect to each other, such that the light beam is directed alternately onto the first and second solar cell (26, 28).

3. System according to claim 2, wherein said directing means are arranged to move a light source (12) of said light beam reciprocately.

4. System according to claim 3, wherein said light source is an optical film (12).

5. System according to claim 4, wherein said directing means are arranged to reciprocately, pivot an end part of the fibre (12) about a stationary pivot point (37).

6. System according to claim 5, wherein said stationary pivot point is located near a free end (24) of said optical fibre (12).

7. System according to claim 2, wherein said directing means are arranged to move said first and second solar cell (26, 28) reciprocately.

8. System according to any of the preceding claims, wherein said directing means comprise at least one mirror and/or prism (20, 22) for directing said light beam onto said solar cells (26, 28).

9. System according to claims 2 and 7, wherein said at least one mirror and/or prism (20, 22) is reciprocately moveable for directing the light beam alternatively onto the first and second solar cell (26, 28).

10. System according to at least claim 2, wherein said directing means comprise at least one electromagnet (34, 36) and at least one element (38, 40) which are arranged to cooperate with each other for providing said reciprocating movement, wherein said electromagnet (34, 36) is connected to at least one of said solar cells (26, 28).

11. System according to claim 10, wherein said directing means comprise two electromagnets (34, 36), wherein said first solar cell (26) is connected to one of the electromagnets (34), whilst the second solar cell is connected to the other electromagnet (36).

12. System according to claim 10 or 11, wherein said at least one element is a f element.

13. System according to any of the preceding claims, wherein said directing means are arranged to direct said light beam onto one of said solar cells (20) when the directing means are in an unpowered condition, when the system is at rest.

14. System according to any of the preceding claims, comprising a laser (10) for generating said light beam.

15. System according to claim 3, wherein said solar cells (26, 28) are positioned relatively close to each other, wherein said light source (12) is arranged to illuminate said solar cells (26, 28) directly.

16. Electrical measurement device, comprising a system according to any of the preceding claims for powering the measurement device.

17. Use of a device according to claim 16, wherein said light beam is partly directed through a region in which electromagnetic radiation is present.

18 Method for transforming light energy into an AC voltage, wherein electrical directing means (20, 22, 34, 36, 38, 40) direct a light beam alternatively onto a first and a second solar cell (26, 28), wherein said solar cells (26, 28) are connected for producing said AC voltage, characterised in that said electrical directing means are powered by at least one of said solar cells (26, 28).

19. System according to any of claims 1-15, comprising a transformer for stepping up said AC voltage to a higher AC voltage.