

H02S

GENERATION OF ELECTRIC POWER BY CONVERSION OF INFRARED RADIATION, VISIBLE LIGHT OR ULTRAVIOLET LIGHT, e.g. USING PHOTOVOLTAIC [PV] MODULES (obtaining electrical energy from radioactive sources [G21H 1/12](#); light sensitive inorganic semiconductor devices [H01L 31/00](#); light sensitive organic semiconductor devices [H10K 30/00](#); thermoelectric devices [H10N 10/00](#); pyroelectric devices [H10N 15/00](#))

Definition statement

This place covers:

- Photovoltaic [PV] power plants, e.g. mobile PV generator systems
- Combination of PV power plants with other systems for generation of electric energy
- Supporting structures for PV modules
- Structural details of PV modules not involving light conversion
- Components or accessories specially adapted for PV modules, e.g. cleaning arrangements, optical components, electrical components, thermal components
- Monitoring or testing of PV systems, e.g. load balancing or fault identification
- Testing of PV devices

References

Limiting references

This place does not cover:

Arrangements for obtaining electrical energy from radioactive sources	G21H 1/12
Light sensitive inorganic semiconductor devices	H01L 31/00
Light sensitive organic semiconductor devices	H10K 30/00
Thermoelectric devices	H10N 10/00
Pyroelectric devices	H10N 15/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Space applications, e.g. power supply for satellites made of solar cell modules	B64G 1/00
Solar heat collectors	F24S
Systems for regulating electric power to the maximum power available from a generator, e.g. from PV cells	G05F 1/67
Circuit arrangements or systems for supplying or distributing electric power	H02J

Special rules of classification

In this subclass, the classification symbols are to be only indicated as Inventive (I).

H02S 10/00

PV power plants; Combinations of PV energy systems with other systems for the generation of electric power

Definition statement

This place covers:

- PV power plants
- Hybrid diesel-PV energy systems
- Hybrid wind-PV energy systems
- Hybrid hydroelectric-PV energy systems
- PV power plants comprising energy storage means integrated therein or associated therewith
- Thermophotovoltaic systems
- Mobile PV generators

H02S 10/10

including a supplementary source of electric power, e.g. hybrid diesel-PV energy systems (combinations with gas-turbine plants [F02C 6/00](#))

Definition statement

This place covers:

PV power plants combined with a supplementary source of electric energy, e.g. combined with a diesel generator or a hydroelectric power plant

References

Limiting references

This place does not cover:

PV energy systems combined with gas-turbine plants	F02C 6/00
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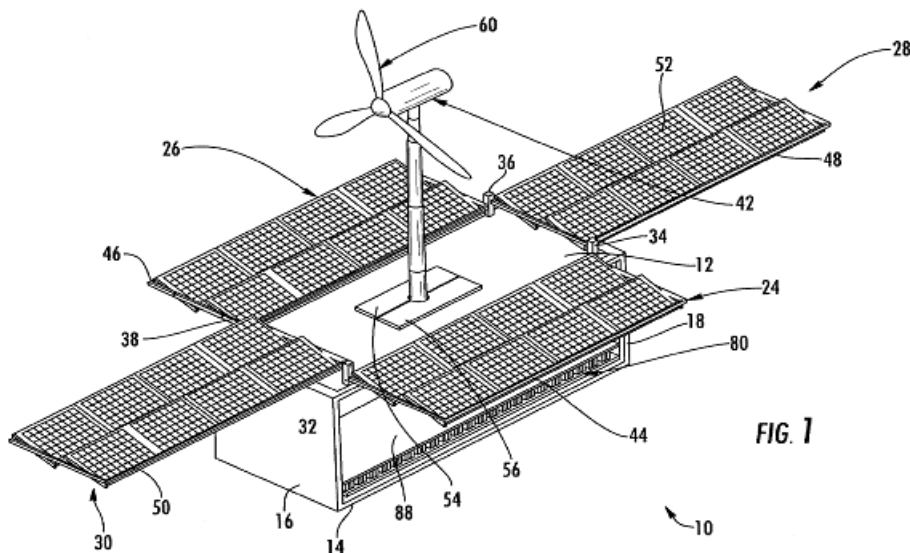
H02S 10/12

Hybrid wind-PV energy systems

Definition statement

This place covers:

Electric power generators, where wind turbines are combined with PV modules, e.g.:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wind Motors per se	F03D
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H02S 10/20

Systems characterised by their energy storage means ([H02S 40/38](#) takes precedence)

Definition statement

This place covers:

PV power plants including rechargeable batteries for energy storage.

References

Limiting references

This place does not cover:

Energy storage means, e.g. batteries, structurally associated with PV modules, e.g. directly mounted onto the module	H02S 40/38
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Energy storage means directly associated or integrated with the PV cell	H01L 31/053
Secondary accumulators structurally combined with charging apparatus, e.g. solar battery charging system	H01M 10/46
Circuit arrangements for charging batteries with solar cells	H02J 7/35

H02S 10/30

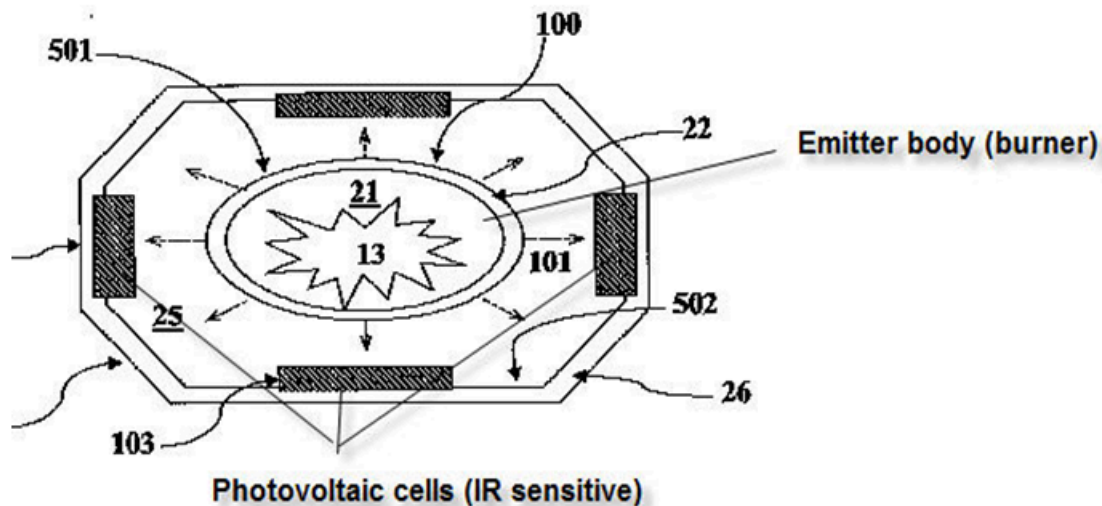
Thermophotovoltaic systems (photovoltaic cells specially adapted for conversion or sensing of infrared [IR] radiation [H01L 31/00](#); thermoelectric devices [H10N 10/00](#))

Definition statement

This place covers:

Systems formed by an infrared radiation emitting source and by a (an array of) low band-gap solar cell(s) which are specifically sensitive to the infrared spectrum emitted by the source. Generally two types of system are the most common one: one in which a special emitter (of refractory materials) is heated (e.g. by a gas flame) and emits a specially adapted infrared spectrum, the other in which the solar light is concentrated in a cavity and converted by the solar cells situated in the cavity.

This subgroup is used to classify documents covering aspects of the systems, including the specific radiators.



Relationships with other classification places

Documents featuring photovoltaic cells optimized for IR radiation spectrum are classified and found in the solar cell groups covering the cell structure or the cell materials ([H01L 31/06](#) and subgroups).

Cells for TPV described independently from the TPV system are classified in the groups according to materials, structure, etc ([H01L 31/068](#)) since they merely refer to solar cells specifically sensitive to IR (IR forming also a part of the solar spectrum)

References

Limiting references

This place does not cover:

Photovoltaic cells specially adapted for conversion or sensing of infrared [IR] radiation	H01L 31/00
Thermoelectric devices	H10N 10/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Burners	F23D
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Synonyms and Keywords

In patent documents, the following abbreviations are often used:

TPV	Thermophotovoltaic
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H02S 10/40

Mobile PV generator systems

Definition statement

This place covers:

PV generator systems being movable or displaceable to provide power to devices external to the generator.

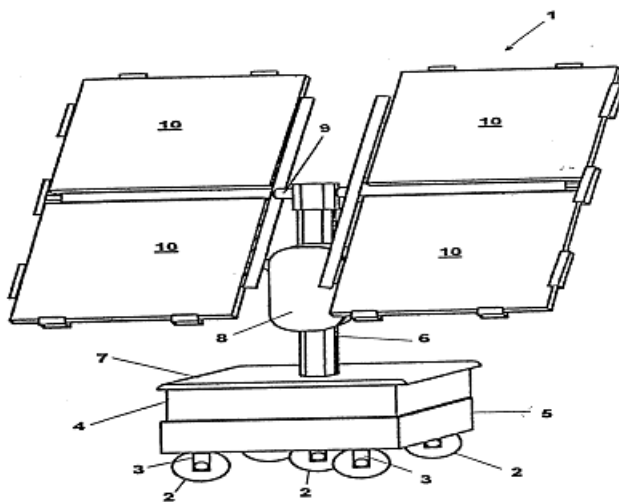


FIG. 1

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Collapsible or foldable PV modules	H02S 30/20
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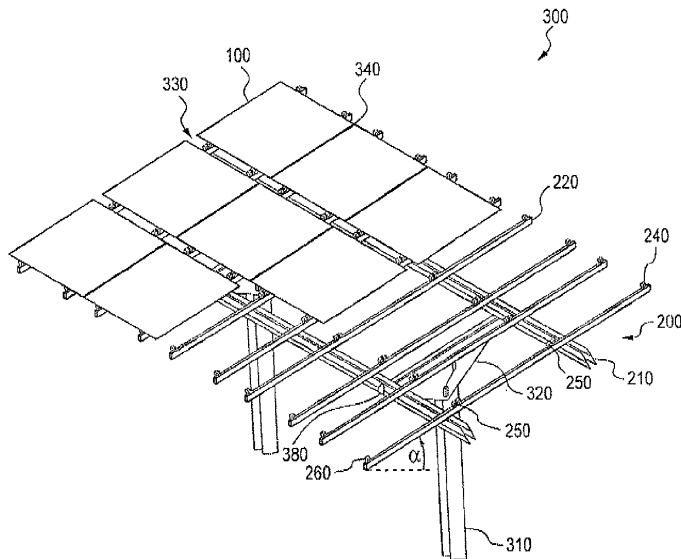
H02S 20/00

Supporting structures for PV modules

Definition statement

This place covers:

- Mechanical structures for supporting one or a plurality of PV modules.
- Floating structures for supporting one or a plurality of PV modules.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Other supports for positioning apparatus or articles per se	F16M 13/00
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Special rules of classification

Supporting structures also intended for use with solar heat collectors should also be classified in groups [F24S 50/20](#) or [F24S 25/00](#)

H02S 20/10

Supporting structures directly fixed to the ground ([H02S 20/30](#) takes precedence)

Definition statement

This place covers:

Supporting structures directly fixed to the ground, where there is no element between the photovoltaic module supporting structure and the ground. The supporting structure does not have any further function other than supporting the photovoltaic module, e.g. a street lamp with a photovoltaic module is an immovable object which should be classified in [H02S 20/20](#).

References

Limiting references

This place does not cover:

Supporting structures being movable or adjustable, e.g. for angle adjustment	H02S 20/30
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H02S 20/20

Supporting structures directly fixed to an immovable object ([H02S 20/30](#) takes precedence)

Definition statement

This place covers:

Supporting structures directly fixed to an immovable object, e.g. a street lamp or a parking device having a photovoltaic module.

References

Limiting references

This place does not cover:

Supporting structures being movable or adjustable, e.g. for angle adjustment	H02S 20/30
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Mobile PV generators	H02S 10/40
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H02S 20/21

specially adapted for motorways, e.g. integrated with sound barriers

Definition statement

This place covers:

PV modules specially adapted for being used and mounted on sound barriers for road or railways, e.g. using the available surfaces of said barriers to produce electrical power.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sound barriers per se	E01F 8/0005
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Special rules of classification

Aspects of such PV modules specifically relating to PV applications should be classified in this subgroup, architectural aspects of the barrier walls are covered elsewhere ([E01F 8/00](#)).

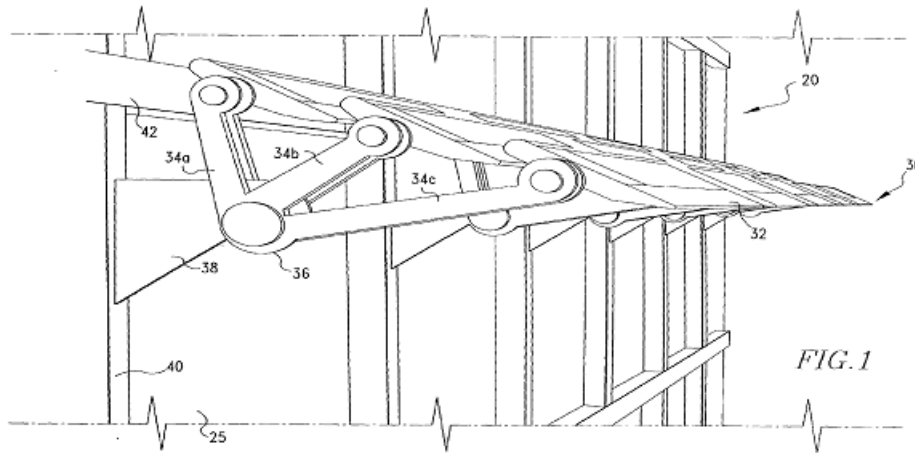
H02S 20/22

especially adapted for buildings

Definition statement

This place covers:

Supporting structure specially adapted for integrating PV modules in buildings, e.g. PV modules mounted on the façade:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Roof tile elements	H02S 20/25
Building materials integrated with PV modules, e.g. façade elements	H02S 20/26

H02S 20/23

especially adapted for roof structures

Definition statement

This place covers:

- Solar PV modules adapted for house roofs, disposed within roof tiles
- Special structural arrangements for installations on house roofs
- Wind protection devices (deflectors) associated with the PV supporting structures
- Ballast devices
- Solar PV modules integrated with Carports.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Roof covering aspects of energy collecting devices, e.g. including solar panels	F24S 20/67
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H02S 20/25

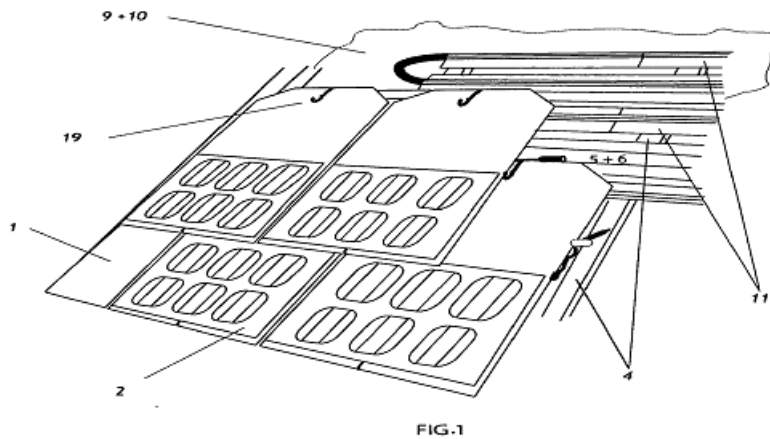
Roof tile elements

Definition statement

This place covers:

Photovoltaic devices integrated to or associated with one roof tile.

Example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Roof covering by making use of tiles	E04D 1/00
Roof covering by making use of flat or curved slabs	E04D 3/00
Solar heat collectors having working fluid conveyed through collector, e.g. solar thermal tiles	F24S 20/69

H02S 20/26

Building materials integrated with PV modules, e.g. façade elements ([H02S 20/25](#) takes precedence)

References

Limiting references

This place does not cover:

Roof tile elements	H02S 20/25
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H02S 20/30

Supporting structures being movable or adjustable, e.g. for angle adjustment

Definition statement

This place covers:

Movable structures to make a photovoltaic module mobile, e.g. solar PV modules integrated in an automobile.

Adjustable structures to adjust the position of the photovoltaic module, e.g. for angle adjustment.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Floating supporting structures	H02S 20/00
Roof tile elements	H02S 20/25

H02S 20/32

especially adapted for solar tracking

Definition statement

This place covers:

Example:

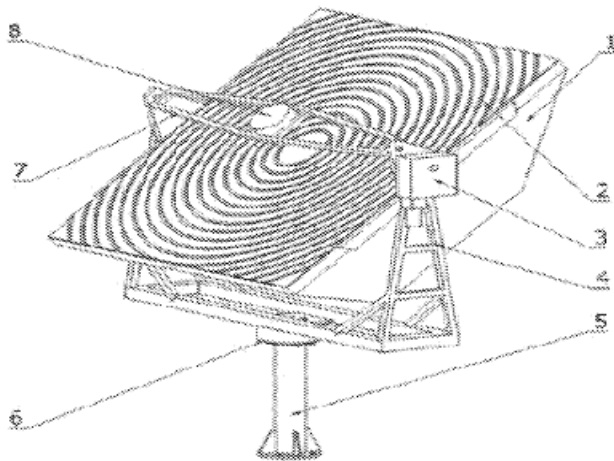


Figure 1

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Solar tracking for solar heat collectors	F24S 30/40
Direction- finders for determining the direction from which electromagnetic waves are being received	G01S 3/78

Control of position or direction	G05D 3/00
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H02S 30/00

Structural details of PV modules other than those related to light conversion (semiconductor device aspects of modules of electrolytic light sensitive devices [H01G 9/20](#), of inorganic PV modules [H01L 31/00](#), of organic PV modules [H10K 30/00](#))

Definition statement

This place covers:

- Frame structures
- Collapsible or foldable PV modules

References

Limiting references

This place does not cover:

Device aspects of modules of electrolytic light sensitive devices	H01G 9/20
Semiconductor device aspects of inorganic PV modules	H01L 31/00
Semiconductor device aspects of organic PV modules	H10K 30/00

H02S 30/10

Frame structures

Definition statement

This place covers:

Frames or parts of frames specially adapted for PV modules, where the frame is not part of a housing or supporting structure. The frames covered by this subgroup are a result of the PV module manufacturing process and surround the laminate layers of the module.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Supporting structures for PV modules	H02S 20/00
Collapsible or foldable PV modules	H02S 30/20
Solar thermal collectors, including mechanical mounting aspects of solar modules, when also suitable for solar thermal collectors	F24S 25/00
Direction-findings for determining the direction from which light is being received, e.g. forming part of solar tracking systems	G01S 3/78

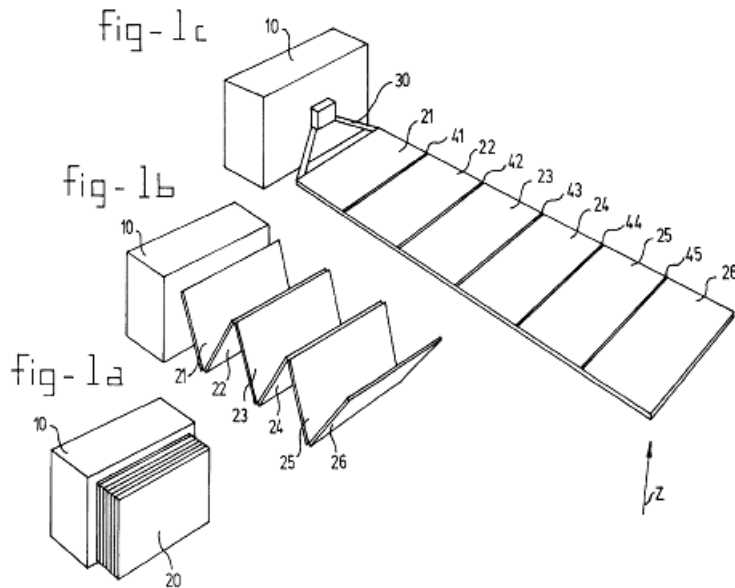
H02S 30/20

Collapsible or foldable PV modules

Definition statement

This place covers:

PV modules specially adapted for being collapsible, rollable, or foldable, e.g. for jalousies, umbrellas, handbags.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mechanical arrangements of foldable PV modules in satellites	B64G 1/44
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Special rules of classification

If the collapsible/foldable property is due to a special frame, then the subject matter is additionally classified in [H02S 30/10](#).

H02S 40/00

Components or accessories in combination with PV modules, not provided for in groups [H02S 10/00](#) - [H02S 30/00](#)

Definition statement

This place covers:

- Cleaning arrangements in combination with PV modules, e.g. means for removing snow
- Optical components in combination with PV modules, e.g. light-concentrating means
- Electrical components in combination with PV modules, e.g. junction boxes, module-to-module interconnection
- Thermal components in combination with PV modules, e.g. cooling means

H02S 40/10

Cleaning arrangements

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cleaning windows	A47L 1/00
Cleaning in general	B08B

H02S 40/12

Means for removing snow

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Snow traps for roof coverings	E04D 13/10
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H02S 40/20

Optical components

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical elements in general	G02B
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H02S 40/22

Light-reflecting or light-concentrating means (directly associated with the PV cell or integrated with the PV cell [H01L 31/054](#))

Definition statement

This place covers:

Example:

Photovoltaic assembly with concentration (1) and spectral splitting (6, 7) of collected light beam:

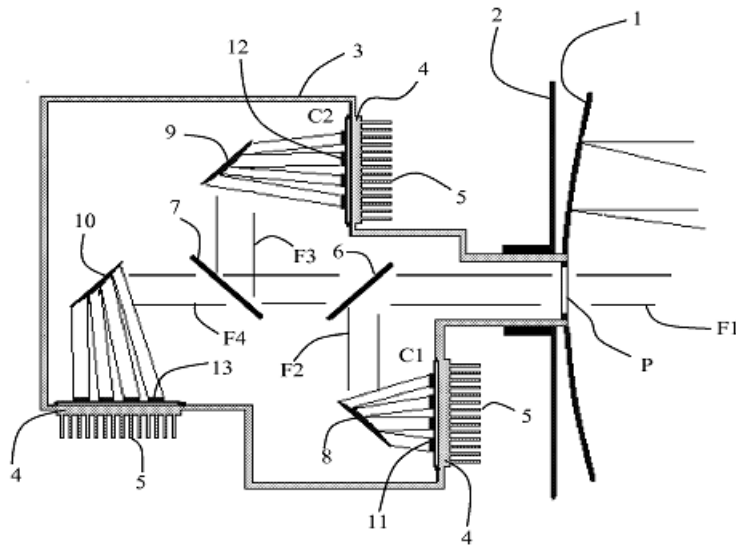


FIG. 1

References

Limiting references

This place does not cover:

Light-reflecting or light-concentrating means directly associated with the PV cell or integrated with the PV cell	H01L 31/054
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Solar heat collectors having concentrating elements	F24S 23/00
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H02S 40/30

Electrical components

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electric line connectors; Electric current collectors	H01R
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H02S 40/32

comprising DC/AC inverter means associated with the PV module itself, e.g. AC modules

Definition statement

This place covers:

- DC/AC inverter means directly associated with the PV module, e.g. inverter on the backside of the PV module.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Regulating electric power from a generator, e.g. from a solar module	G05F 1/67
Circuit arrangements or systems for supplying or distributing electric power, e.g. circuits for connecting the PV module to the inverter	H02J
Inverters per se	H02M

H02S 40/34

comprising specially adapted electrical connection means to be structurally associated with the PV module, e.g. junction boxes

Definition statement

This place covers:

- Junction boxes associated with and connected with the PV module, e.g. one box per module for electrical connection, or comprising bypass diodes.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Terminal blocks	H01R 9/24
Distribution boxes; Connection or junction boxes	H02G 3/08

H02S 40/36

characterised by special electrical interconnection means between two or more PV modules, e.g. electrical module-to-module connection

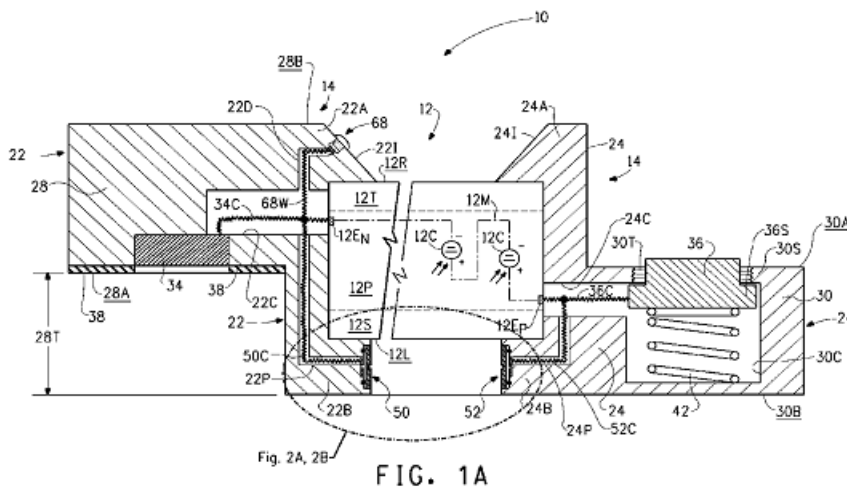
Definition statement

This place covers:

Electrical interconnection between two or more PV modules.

Example:

- Electrical contacts 34 and 36 are used for interconnecting two PV modules:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Conductive pastes as such	H01B 1/20
Electrodes of PV cells	H01L 31/022425
Particular structures for electrical interconnecting of adjacent thin film solar cells in the module	H01L 31/0465
Interconnection between solar cells inside a PV module	H01L 31/05

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

"Interconnection" in this case means electrical connection, not mechanical.

H02S 40/38

Energy storage means, e.g. batteries, structurally associated with PV modules

Definition statement

This place covers:

Energy storage means which are mechanically connected PV modules or specially adapted to integrate with the PV modules. Electrical connection between batteries and photovoltaic modules are not classified in this subgroup, as well as batteries not being part of the photovoltaic module itself.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Battery charging utilising light sensitive cells	H02J 7/35
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H02S 40/40

Thermal components ([H02S 10/30](#) takes precedence)

References

Limiting references

This place does not cover:

Thermophotovoltaic systems	H02S 10/30
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H02S 40/42

Cooling means (cooling means directly associated or integrated with the PV cell [H01L 31/052](#))

References

Limiting references

This place does not cover:

Cooling means directly associated or integrated with the PV cell	H01L 31/052
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H02S 40/44

Means to utilise heat energy, e.g. hybrid systems producing warm water and electricity at the same time (directly associated with the PV cell or integrated with the PV cell [H01L 31/0525](#))

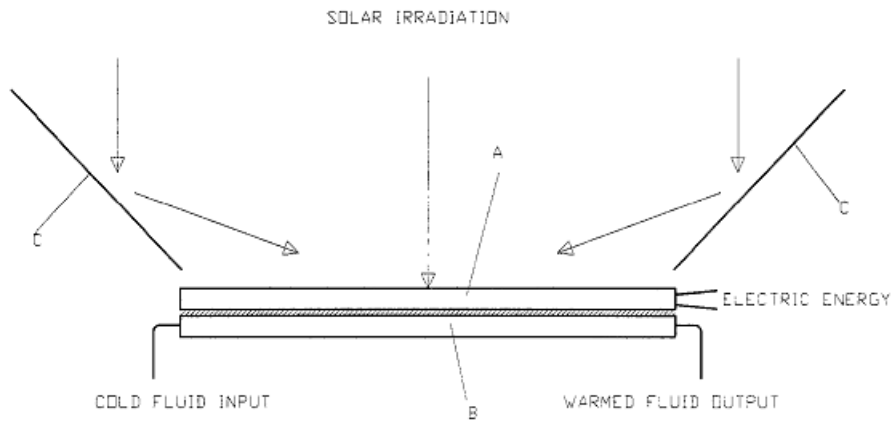
Definition statement

This place covers:

- Hybrid PV modules, producing warm water and electricity at the same time

Example:

STRUCTURE OF THE PANEL



References

Limiting references

This place does not cover:

Means to utilise heat energy directly associated with the PV cell or integrated with the PV cell	H01L 31/0525
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Using solar heat per se	F24S 20/00
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H02S 50/00

Monitoring or testing of PV systems, e.g. load balancing or fault identification

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Testing of electric apparatus, lines, or components for short-circuits, discontinuities, leakage, or incorrect line connection	G01R 31/50
Burglar, theft or intruder alarms	G08B 13/00

H02S 50/10

Testing of PV devices, e.g. of PV modules or single PV cells (testing of semiconductor devices during manufacturing {[H01L 22/00](#)})

Definition statement

This place covers:

- Testing of electrical properties of PV devices in the dark state, e.g. short circuit test
- Testing of electrical properties, e.g. I-V characteristics, of PV devices under solar simulators

References

Limiting references

This place does not cover:

Testing of semiconductor devices during manufacturing	H01L 22/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Lighting devices intended for fixed installation, e.g. solar simulators	F21S 8/00
Testing of general semiconductor devices	G01R 31/26
Testing of electrical properties of electrical power supplies	G01R 31/40
Electroluminescent light sources	H05B 33/00

H02S 50/15

using optical means, e.g. using electroluminescence

Definition statement

This place covers:

- Testing of optical responses e.g. electroluminescence, light reflection or light absorption, of PV devices

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Investigating or analysing materials by fluorescence or phosphorescence	G01N 21/64
Investigating or analysing materials by electroluminescence	G01N 21/66

H02S 99/00

Subject matter not provided for in other groups of this subclass

Definition statement

This place covers:

This group is to be used only in rare situations where the subject matter is appropriate for [H02S](#) but does not clearly belong in any of the above main groups.