

## H02J

### ELECTRIC POWER NETWORKS; CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS FOR STORING ELECTRIC ENERGY

#### Definition statement

*This place covers:*

- AC and/or DC supplying systems;
- AC and/or DC distribution networks;
- circuit arrangements for battery supplies, including charging or control thereof, or coordinated supply from two or more sources of any kind;
- circuit arrangement providing remote indication and control of a network switch;
- systems for supplying or distributing electric power by electromagnetic waves.

#### References

##### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Electrical networks for vessels	<a href="#">B63J</a>
Electrical networks for aircrafts	<a href="#">B64D</a>
Ground or aircraft-carrier-deck installations for supplying electrical power to stationary aircraft	<a href="#">B64F 1/35</a>
Power supply circuits for apparatus for measuring X-radiation, gamma radiation, corpuscular radiation or cosmic radiation	<a href="#">G01T 1/175</a>
Electric power supply circuits specially adapted for use in electronic time-pieces with no moving parts	<a href="#">G04G 19/00</a>
For digital computers	<a href="#">G06F 1/26</a>
For discharge tubes	<a href="#">H01J 37/248</a>

##### Informative references

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

Steam turbines	<a href="#">F01K</a>
Gas turbines	<a href="#">F02C</a>
Wind power generation	<a href="#">F03D</a>
Fuel cells	<a href="#">H01M 8/00</a>
Boards, substations or switching arrangements	<a href="#">H02B</a>
Electric protections	<a href="#">H02H</a>
Circuits or apparatus for the conversion of electric power, arrangements for control or regulation of such circuits or apparatus	<a href="#">H02M</a>
Control or regulation of electric motors, electric generators or dynamo-electric converters	<a href="#">H02P</a>
Solar power generation	<a href="#">H02S</a>
Control of high-frequency power	<a href="#">H03L</a>

Additional use of power line or power network for transmission of information	<a href="#">H04B</a>
Photovoltaic elements	<a href="#">H10F 10/00</a> , <a href="#">H10F 19/00</a>

### Special rules of classification

Claimed devices, systems, and methods always have to be classified. If there is additional information disclosed, then indexing codes for the additional information must be allocated.

If a breakdown indexing code of the subclass [H02J](#) (only for additional information) is given, it must always be accompanied by a main trunk symbol under [H02J](#), for invention or additional information.

### Glossary of terms

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

Wireless energy transfer	non-conductive energy transfer, even if conductors can be used for implementing the separated sending and receiving units
--------------------------	---

## H02J 1/00

### Circuit arrangements for DC mains or DC distribution networks

### References

#### Application-oriented references

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Electric propulsion with power supplied within the vehicle	<a href="#">B60L 50/00</a>
Electric circuits specially adapted for vehicles	<a href="#">B60R 16/00</a>
Power supplies for memories	<a href="#">G05G</a>
Power supply, e.g. DC power supply, for computers	<a href="#">G06F 1/26</a>
Fuel cells	<a href="#">H01M 8/00</a>
Power supplies for DC lamps	<a href="#">H05B 47/00</a>

#### Informative references

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

Load protection by tripping of the load for DC systems	<a href="#">H02H</a>
DC/DC power converters	<a href="#">H02M 3/00</a>
AC/DC or DC/AC power converters	<a href="#">H02M 7/00</a>

## H02J 1/02

### Arrangements for reducing harmonics or ripples

#### References

##### *Application-oriented references*

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Arrangements for reducing harmonics or ripples in converters	<a href="#">H02M 1/14</a>
--	---------------------------

## H02J 1/10

### Parallel operation of DC sources

#### Definition statement

*This place covers:*

Circuit arrangements, systems and methods for the parallel connection of DC sources. Parallel operation must be interpreted as the operational characteristics allowing that the parallel-connected sources supply the load, for instance, how to share the load among the different sources, or how to sequentially switch different power sources on.

#### References

##### *Application-oriented references*

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Parallel operation of DC sources involving batteries	<a href="#">H02J 7/34</a>
--	---------------------------

## H02J 1/102

### being switching converters ([H02J 1/108](#), [H02J 1/12](#) take precedence)

#### Definition statement

*This place covers:*

Parallel operation of DC sources, where the sources are switched mode power supplies (SMPS), i.e. power electronic converters with a DC output.

#### References

##### *Limiting references*

*This place does not cover:*

Parallel operation of DC sources using diodes blocking reverse current flow	<a href="#">H02J 1/108</a>
Parallel operation of DC generators with converters, e.g. with mercury-arc rectifier	<a href="#">H02J 1/12</a>

**Informative references**

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

Conversion of DC power input into DC power output without intermediate conversion into AC by static converters using semiconductor devices as final control devices for a single load	<a href="#">H02M 3/158</a>
Single converters with a plurality of output stages connected in parallel	<a href="#">H02M 3/285</a>

**H02J 1/108**

having arrangements for blocking reverse current flow, e.g. using diodes  
([H02J 1/12](#) takes precedence)

**References****Limiting references**

This place does not cover:

Parallel operation of DC sources having power converters with further DC sources without power converters, e.g. with mercury-arc rectifier	<a href="#">H02J 1/12</a>
--	---------------------------

**H02J 1/14**

**Balancing load and power generation in DC networks**

**Definition statement**

This place covers:

Balancing the load in a DC distribution network, either by avoiding overloading one section of the network, or by load shedding

**Relationships with other classification places**

Group [H02J 1/14](#), in practice, relates for load shedding. Load balancing by buffering is classified in group [H02J 7/34](#).

**References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Balancing the load in a network by batteries	<a href="#">H02J 7/34</a>
--	---------------------------

**H02J 3/00**

**Circuit arrangements for AC mains or AC distribution networks**

**Definition statement**

This place covers:

- Arrangements for selectively connecting the load to one among a plurality of power lines or power sources
- Arrangements for reducing harmonics or ripples

## Definition statement

- Arrangements using a single network for simultaneous distribution of power at different frequencies; using a single network for simultaneous distribution of AC power and of DC power
- Arrangements for connecting networks of the same frequency but supplied from different sources
- Constant-current supply systems
- Arrangements for adjusting, eliminating, or compensating reactive power in networks
- Arrangements for preventing or reducing oscillations of power in networks
- Arrangements for eliminating or reducing asymmetry in polyphase networks
- Arrangements for balancing of the load in a network by storage of energy
- Arrangements for transfer of electric power between networks of substantially different frequency
- Arrangements for transfer of electric power between AC networks via a high-tension DC link
- Arrangements for parallelly feeding a single network by two or more generators, converters or transformers

## References

## Informative references

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

Wind turbines	<a href="#">F03D 9/00</a>
Computer systems for trading	<a href="#">G06Q 30/00</a>
Systems, methods for trading (electricity/gas/water)	<a href="#">G06Q 50/06</a>
Details of switches for load protection	<a href="#">H01H</a>
Mechanical details of connectors	<a href="#">H01R</a>
Electromechanical details	<a href="#">H02B</a>
Load protection by tripping of the load for AC systems	<a href="#">H02H</a>
Harmonic reduction application for converters	<a href="#">H02M 1/12</a>
Details of converters for reactive power compensation and AC power generation from DC sources	<a href="#">H02M 7/48</a>
Details of converters for HVDC	<a href="#">H02M 7/7575</a>
Preventing/reducing oscillation with a single generator	<a href="#">H02P 9/00</a>
Photovoltaic modules	<a href="#">H10F 19/00</a>

## H02J 3/0014

## for preventing or reducing power oscillations in networks

## Definition statement

This place covers:

Circuits arrangements, devices and methods for preventing, avoiding or correcting oscillations of voltage, current or power in an AC power network.

## References

## Informative references

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

Arrangements for controlling electric generators for the purpose of obtaining a desired output	<a href="#">H02P 9/00</a>
--	---------------------------

**H02J 3/01****Arrangements for reducing harmonics or ripples****References****Informative references**

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

Arrangements for reducing harmonics or ripples in converters	<a href="#">H02M 1/12</a>
--	---------------------------

**H02J 3/06****Controlling the transfer of power between connected networks; Controlling load sharing between connected networks****References****Informative references**

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

Arrangements for feeding a single network by two or more generators, converters or transformers in parallel	<a href="#">H02J 3/38</a>
---	---------------------------

**H02J 3/12****Arrangements for adjusting voltage in AC networks by changing a characteristic of the network load****References****Informative references**

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

Voltage regulation	<a href="#">G05F 1/10</a>
--------------------	---------------------------

**H02J 3/18****Arrangements for adjusting, eliminating or compensating reactive power in networks****Relationships with other classification places**

In group [H02H 9/08](#), the coil is not used for any reactive power compensation, but for limiting earth fault currents.

**References****Informative references**

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

Use of Petersen coils	<a href="#">H02H 9/08</a>
-----------------------	---------------------------

**H02J 3/1842**

having reactive elements actively controlled by bridge converters, e.g. active filters or static compensators [STATCOM]

**References****Informative references**

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

Arrangements having reactive elements actively controlled by bridge converters, e.g. bridge combining both series and shunt compensators	<a href="#">H02J 3/1814</a>
--	-----------------------------

**H02J 3/32**

using batteries or super capacitors with converting means

**References****Informative references**

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

Vehicle-to-grid [V2G] arrangements	<a href="#">B60L 55/00</a>
------------------------------------	----------------------------

**H02J 3/34**

Arrangements for transfer of electric power between networks of substantially different frequency

**References****Informative references**

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

Frequency converters	<a href="#">H02M 5/00</a>
----------------------	---------------------------

**H02J 3/38**

Arrangements for feeding a single network from two or more generators or sources in parallel; Arrangements for feeding already energised networks from additional generators or sources in parallel

**References****Informative references**

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

Vehicle-to-grid [V2G] arrangements	<a href="#">B60L 55/00</a>
Parallel connections of DC/AC converters not for feeding a network, but a local load	<a href="#">H02M 7/493</a>

## H02J 4/00

**Circuit arrangements for mains or distribution networks not specified as AC or DC; Circuit arrangements for mains or distribution networks combining AC and DC sections or sub-networks (arrangements using intermediate DC-AC-DC conversion [H02J 1/002](#); arrangements using high-voltage DC [HVDC] links [H02J 3/36](#))**

### Definition statement

*This place covers:*

Circuit arrangements for mains or distribution networks containing both AC and DC (for instance, for planes) or for (rarely) networks whose nature (AC or DC) is not specified

## H02J 4/25

**for transfer of electric power between AC and DC networks, e.g. for supplying the DC section within a load from an AC mains system**

### Definition statement

*This place covers:*

Circuit arrangements, systems and methods for supplying a DC load from an AC power source. Only general-purpose circuits (not application-oriented/driven) are classified in the group.

### References

#### Informative references

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

Circuit arrangements for DC mains or DC distribution networks	<a href="#">H02J 1/00</a>
Magnets; Inductances; Transformers; Selection of materials for their magnetic properties	<a href="#">H01F</a>
Conversion of AC power input into DC power output; Conversion of DC power input into AC power output	<a href="#">H02M 7/00</a>

### Special rules of classification

A system used for feeding an AC distribution network from the output of DC power source like fuel cells, solar panels belong to [H02J 3/38](#) and not to [H02J 4/25](#), even if a DC to AC transfer is involved.

## H02J 7/00

**Circuit arrangements for charging or discharging batteries or for supplying loads from batteries**

### Definition statement

*This place covers:*

Circuit arrangements for charging batteries. Rarely, general-purpose discharging, battery management, e.g. sequentially discharging batteries, or load-supplying, e.g. when they are not too concerned by the characteristics of the load.



## References

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Charging stations or on-board charging equipment for electrically-propelled vehicles	<a href="#">B60L 53/00</a>
Details of telephone stands	<a href="#">H04M</a>

### Informative references

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

Electrical circuits for vehicles	<a href="#">B60R</a>
Vehicle starting circuits	<a href="#">F02D</a>
Methods for charging or discharging secondary cells	<a href="#">H01M 10/44</a>
Mechanical details of battery charger alternators	<a href="#">H02K</a>
DC/DC power converters	<a href="#">H02M 3/00</a>
AC/DC or DC/AC power converters	<a href="#">H02M 7/00</a>
Perpetuum mobile	<a href="#">H02N</a>
Control of alternators	<a href="#">H02P 9/00</a>

## Special rules of classification

If the document deals with the controlled charging of a capacitor, e.g. a supercapacitor, it is mandatory to assign a combination of the symbol [H02J 7/345](#) and CPC symbols, which would apply, if the capacitor was replaced with a battery.

## H02J 7/34

**Parallel operation in networks using both storage and other DC sources, e.g. providing buffering ([H02J 7/14](#) takes precedence)**

### Definition statement

*This place covers:*

Battery charging where power comes from one or more different DC power sources, e.g. charging from solar arrays. It may further involve the supply of a load and the resulting modes of operation (battery charging, battery supplying the load).

## References

### Limiting references

*This place does not cover:*

Arrangements for charging batteries from dynamo-electric generators driven at varying speed, e.g. on vehicle	<a href="#">H02J 7/14</a>
--	---------------------------

## H02J 9/00

### Circuit arrangements for emergency or stand-by power supply, e.g. for emergency lighting

#### Definition statement

*This place covers:*

Power sources acting when the main source fails, i.e. uninterruptible (on-line and off-line) power supplies [UPS] and back-up power supplies

Power supplies able to operate in a "standby" mode (low power or sleep modes).

#### References

##### Informative references

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

With provision for charging standby battery	<a href="#">H02J 7/00</a>
UPS for computers	<a href="#">G06F 1/00</a>
UPS for communication stations	<a href="#">H04M</a>
Details of lamp	<a href="#">H05B 47/00</a>

#### Special rules of classification

The following Indexing Codes are to be used for classifying additional information:

<a href="#">H02J 9/007</a>	power saving operation when no load is present
<a href="#">H02J 9/063</a>	common neutral
<a href="#">H02J 9/067</a>	using a single transformer with multiple primaries (one for each AC energy source) and a secondary for the loads
<a href="#">H02J 9/068</a>	electronic means for switching from one power supply to another, avoiding parallel connection

## H02J 9/02

### in which an auxiliary distribution system and its associated lamps are brought into service

#### Definition statement

*This place covers:*

Emergency light systems integrated typically by a back-up power source, a set of lamps and a dedicated auxiliary distribution system powering the lamps from the back-up power source

#### References

##### Informative references

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

A lamp not being an emergency lamp, but a lamp which is normally fed by the mains and during contingency by a battery, even if no DC/AC converters are not involved	<a href="#">H02J 9/065</a>
---	----------------------------

**H02J 9/061****{for DC powered loads}****Definition statement***This place covers:*

Emergency, back-up or standby power supplies integrating power electronic converters for the different power conversions within the units: e.g. rectifiers, battery chargers, voltage regulators.

**H02J 11/00**

**Circuit arrangements for providing service supply to auxiliaries of stations in which electric power is generated, distributed or converted**

**References****Informative references**

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

Emergency or standby power supply arrangements	<a href="#">H02J 9/00</a>
--	---------------------------

**H02J 13/00**

**Circuit arrangements for providing remote monitoring or remote control of equipment in a power distribution network**

**Definition statement***This place covers:*

Operation-related documents, i.e. there must be at least switching on/off or generator or load (or information of such an event) or any other similar action (i.e. sending settings of an inverter connecting a photovoltaic array to the power network).

It also covers specific monitoring of power networks (tailored to such application).

Concerning smart grids, documents where the relevant features concern electrical engineering and not ICT technologies, are classified here.

**References****Informative references**

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

Electricity meters involved (in particular smart meters)	<a href="#">G01D 4/00</a>
Measuring of electric variables	<a href="#">G01R</a>
Power strips with locally controlled on/off capability for computers	<a href="#">G06F 1/266</a>
Data processing systems or methods adapted for electricity supply	<a href="#">G06Q 50/06</a>
Transmission systems for measured values or control signals	<a href="#">G08C</a>
Details of switches	<a href="#">H01H</a>
Circuits for indication of single switches	<a href="#">H01H 9/167</a>
Power strips with locally controlled on/off capability	<a href="#">H01R 13/66</a>
Power line carrier	<a href="#">H04B 3/54</a>

Transmission of digital information	<a href="#">H04L</a>
Telecontrol or telemetry systems	<a href="#">H04Q 9/00</a>
Wireless communication	<a href="#">H04W</a>

## H02J 15/00

### Systems for storing electric energy specially adapted for power networks

#### Definition statement

*This place covers:*

Energy storage systems having either relevant power management issues, or having (or be ready/able for) an interaction with the (AC or DC) power network (but with focus on the storage system). The subject-matter stays normally at system level (there are other CPC technical fields dealing with the specific storage technologies). Under this approach, the group has two subdivisions according to two different technologies:

- Systems for storing electric energy in the form of hydraulic energy
- Systems for storing electric energy in the form of pneumatic energy

#### References

##### Limiting references

*This place does not cover:*

Mechanical systems therefor	<a href="#">F01 - F04</a>
Systems for storing electric energy in chemical form	<a href="#">H01M</a>

##### Informative references

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

Arrangements for balancing of the load in networks by storage of energy	<a href="#">H02J 3/28</a>
Hydrogen production by electrolyses of water	<a href="#">C25B 1/04</a>
Storage heaters	<a href="#">F24H 7/00</a>
Heat storage	<a href="#">F28D 20/00</a>
Capacitors	<a href="#">H01G</a>
Flywheels for dynamo-electric machines	<a href="#">H02K 7/02</a>

## H02J 50/00

### Circuit arrangements or systems for wireless supply or distribution of electric power

#### Definition statement

*This place covers:*

Functional and operational aspects of systems for the wireless supply or distribution of electric power, regardless of the type of wireless power transmission used.

Circuit arrangements for the wireless supply or distribution of electric power.

## Definition statement

In this main group, wireless supply or distribution of electric power involves both of the following steps:

- (1) conversion of electrical energy from a power source for transfer by wireless transmission;
- (2) reception of the wirelessly transmitted energy and re-conversion into electrical energy for distribution or delivery to an electrical load.

## References

**Application-oriented references**

*Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Inductive energy transfer between a charging station and an electric vehicle	<a href="#">B60L 53/12</a>
--	----------------------------

## Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

WPT	Wireless Power Transfer
-----	-------------------------

*In patent documents, the following words/expressions are often used as synonyms:*

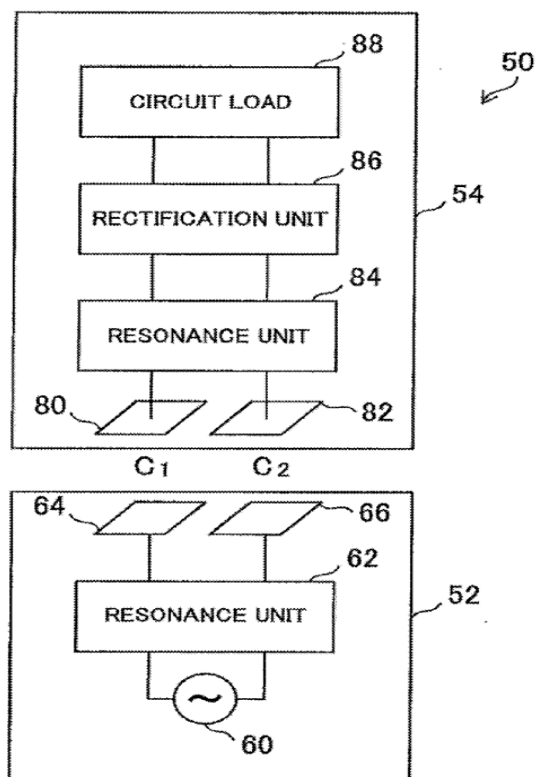
- "cordless power transfer" or "wireless power transmission" or "wireless energy transmission" or "wireless power transfer" or "contactless power transfer"

**H02J 50/05****using capacitive coupling****Definition statement**

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power using capacitive coupling between the plates of at least two capacitive elements, the plates being located in separate units involved in contactless power transmission.

The figure below is an illustrative example which falls within the scope of this subgroup. In the figure, the pairs of plates 64 and 80, and 66 and 82 create two capacitive elements C1 and C2 through which power is transferred from a power transmitter 52 to a power receiver 54.



## References

### Informative references

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

Capacitors; Capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices of the electrolytic type	<a href="#">H01G</a>
---	----------------------

## H02J 50/10

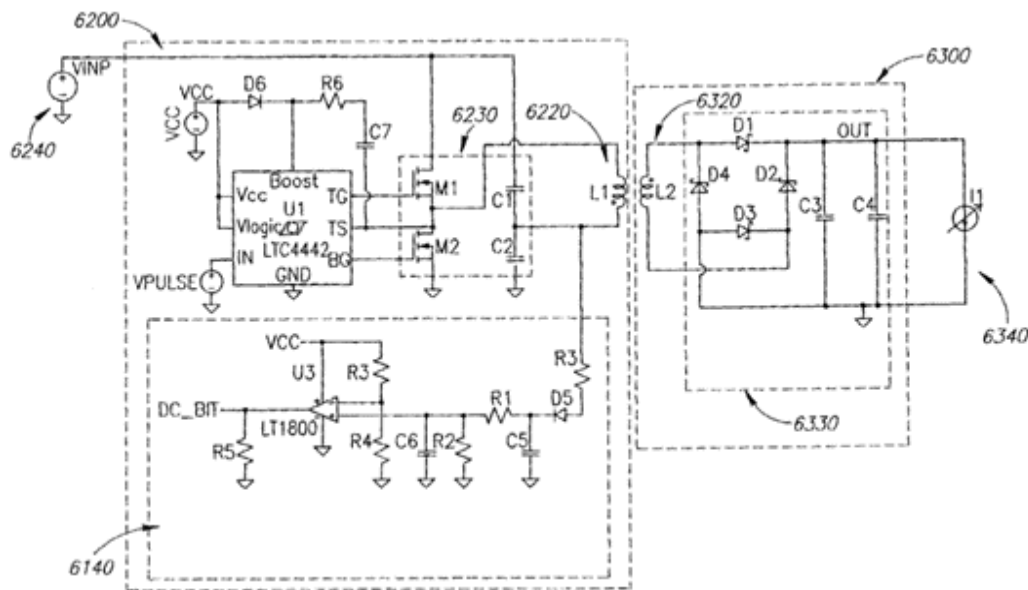
### using inductive coupling

### Definition statement

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power using inductive coupling, i.e. electromagnetic interaction between two or more inductive coils, at least one coil being located in a unit separate from the others, the units being involved in contactless power transmission.

The figure below is an illustrative example which falls within the scope of this subgroup.



## References

### Informative references

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

Magnets; inductances; transformers	<a href="#">H01F</a>
Adaptations of transformers or inductances for inductive coupling	<a href="#">H01F 38/14</a>
Conversion of DC power input into DC power output	<a href="#">H02M 3/00</a>
Conversion of AC power input into AC power output	<a href="#">H02M 5/00</a>
Conversion of AC power input into DC power output; conversion of DC power input into AC power output	<a href="#">H02M 7/00</a>
Induction heating	<a href="#">H05B 6/02</a>

## H02J 50/12

### of the resonant type

### Definition statement

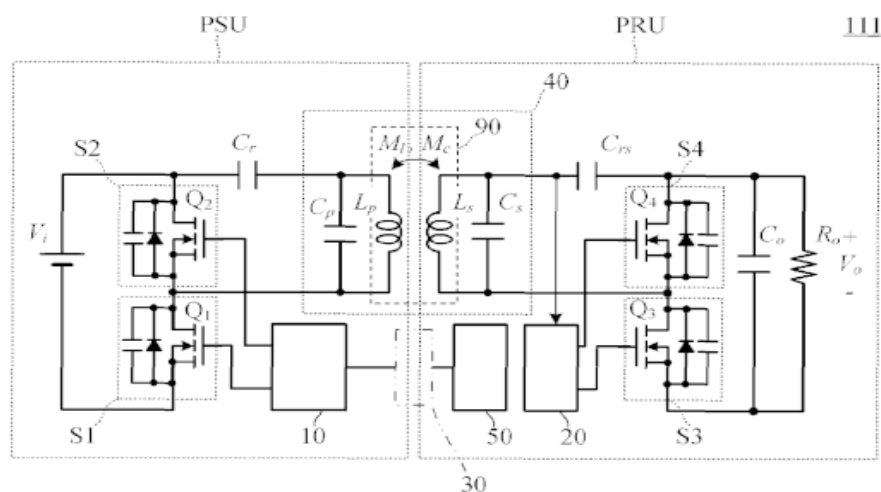
This place covers:

Circuit arrangements or systems for wireless supply or distribution of electric power using inductive coupling of the resonant type, i.e. in which at least one coil forms part of a resonant circuit.

In the illustrative example, resonant circuits Cr-Cp-Lp and Crs-Cs-Ls constitute a resonant circuit 40 which has a specific resonant frequency  $f_r$  at which the total impedance of the resonant circuit 40 is

minimized so that transmission efficiency of electric power between the power emitter circuit in PSU and power receiver circuit in PRU is increased.

FIG. 1



## References

### Informative references

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

Magnets; inductances; transformers	<a href="#">H01F</a>
Converters	<a href="#">H02M</a>
Resonant circuits, resonators	<a href="#">H03H</a>
Tuning resonant circuits	<a href="#">H03J</a>

## H02J 50/15

### using ultrasonic waves

## References

### Informative references

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

Non-electric signal transmission systems using acoustic waves	<a href="#">G08C 23/02</a>
Transmission systems employing ultrasonic waves	<a href="#">H04B 11/00</a>

## H02J 50/20

### using microwaves or radio frequency waves

## Definition statement

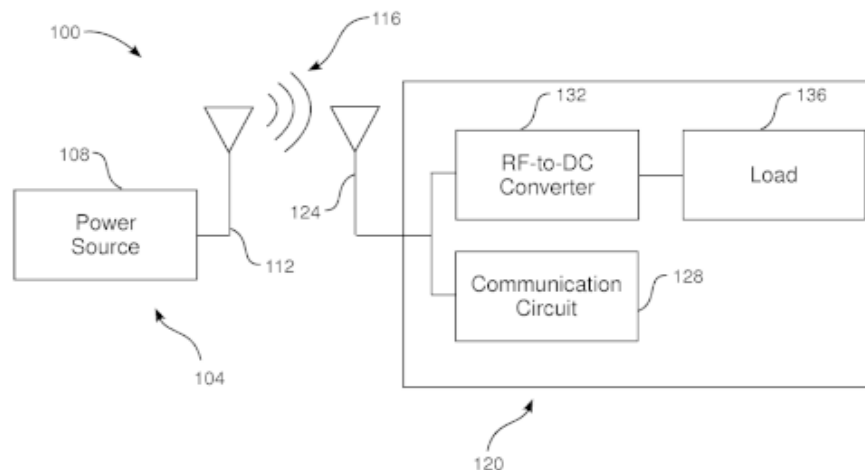
This place covers:

Circuit arrangements or systems for wireless supply or distribution of electric power using microwaves or radio frequency waves.



## Definition statement

The figure below exemplifies the subject-matter to be classified in this subgroup. Power generated in power source 108 is converted into radiofrequency and transmitted by antenna 112 in transmitter 104 to antenna 124 in receiver 120, and used to power load 136.



## References

## Informative references

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

Radiofrequency identification	<a href="#">G06K</a>
Aerials	<a href="#">H01Q</a>
Radio transmission systems	<a href="#">H04B 7/00</a>

## H02J 50/23

**characterised by the type of transmitting antennas, e.g. directional array antennas or Yagi antennas**

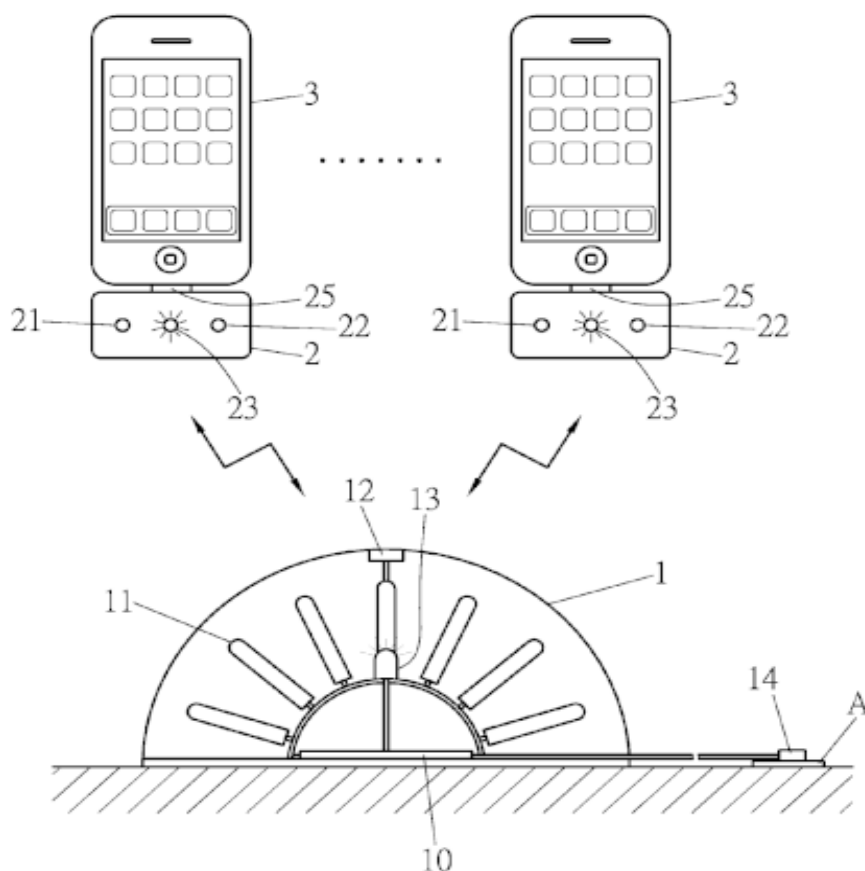
## Definition statement

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power using microwaves or radio frequency waves, characterised by the type of transmitting antennas, e.g. directional array antennas or Yagi antennas

## Definition statement

The figure below is an illustrative example relevant for this subgroup. The directional antenna 11 of the transmitting station 1 sends power to the receiver 21 of the charging device 2.



## References

## Informative references

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

Types of antennas, structural details or features of antennas, special arrangements of antennas	<a href="#">H01Q</a>
Radio transmission systems	<a href="#">H04B 7/00</a>

## H02J 50/27

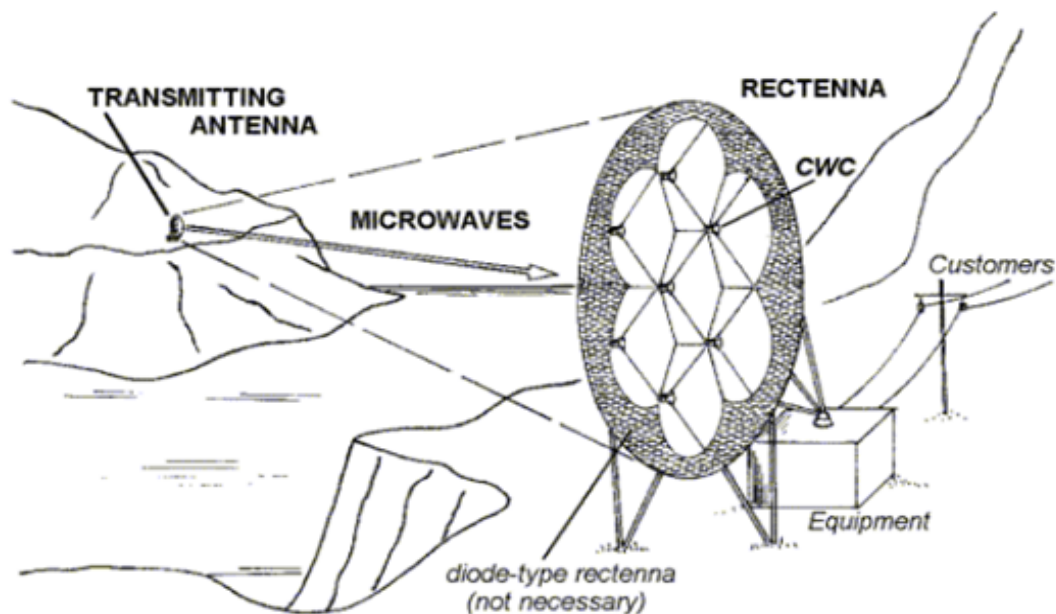
characterised by the type of receiving antennas, e.g. rectennas

## Definition statement

This place covers:

Circuit arrangements or systems for wireless supply or distribution of electric power using microwaves or radio frequency waves characterised by the type of receiving antennas, e.g. rectennas.

The figure below is an illustrative example relevant for this subgroup.



## References

### Informative references

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

Types of antennas, structural details or features of antennas, special arrangements of antennas	<a href="#">H01Q</a>
Radio transmission systems	<a href="#">H04B 7/00</a>

## H02J 50/30

using light, e.g. lasers

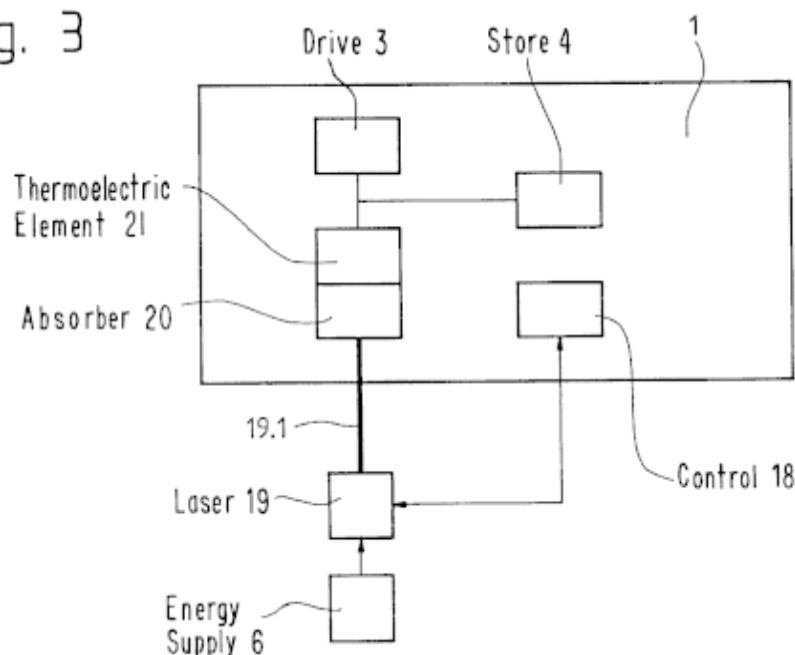
### Definition statement

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power using light, e.g. lasers

The figure below is an illustrative example for this subgroup. A laser 19.1 emitted by laser unit 19 heats absorber 20 and heat is converted into electrical energy by thermoelectric element 21.

Fig. 3



## References

### Informative references

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

Non-electric transmission systems using light waves	<a href="#">G08C 23/04</a>
Lasers	<a href="#">H01S 3/00</a>
Transmission systems employing infrared, visible or ultraviolet light	<a href="#">H04B 10/00</a>

## H02J 50/40

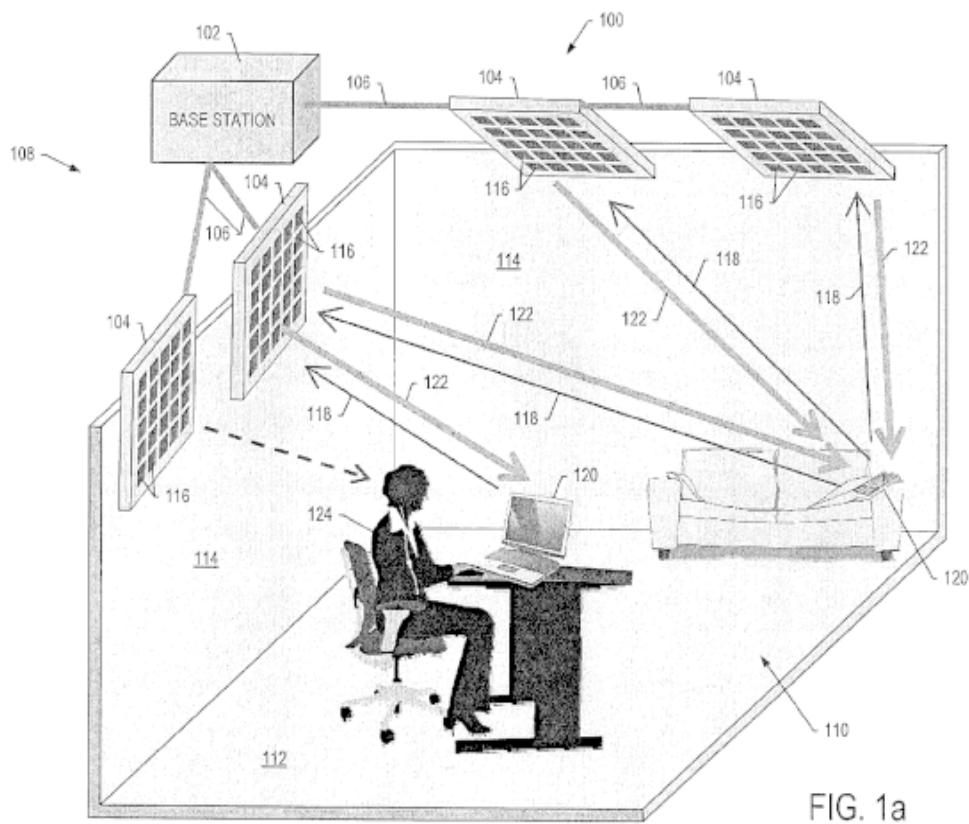
using two or more transmitting or receiving devices ([H02J 50/50](#) takes precedence)

### Definition statement

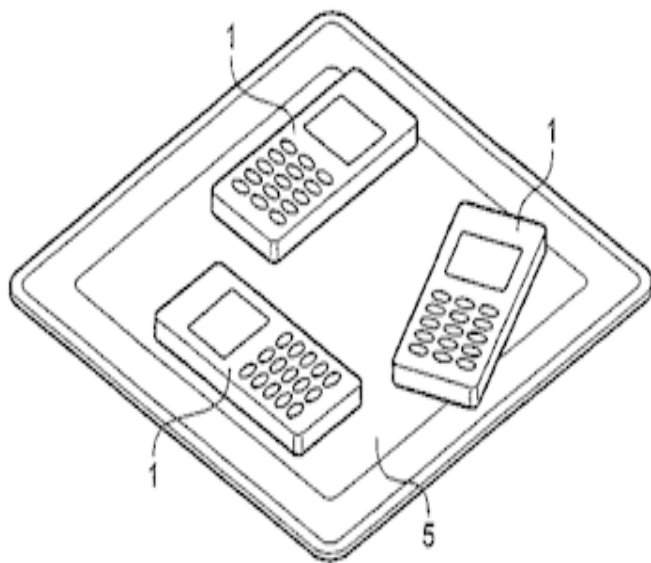
This place covers:

Circuit arrangements or systems for wireless supply or distribution of electric power involving two or more transmitting or receiving devices.

The figure below is also an illustrative example for this subgroup. In the figure, the several transmitting devices transmit electric power to several receiving devices simultaneously.



The figure below is also an illustrative example of this subgroup with two or more receiving devices involved. In the figure, the transmitting device transmits electric power to several receiving devices 1 simultaneously



## References

### Limiting references

*This place does not cover:*

using additional energy repeaters between transmitting devices and receiving devices	<a href="#">H02J 50/50</a>
--	----------------------------

### Informative references

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

Radio transmission diversity systems using a plurality of spaced independent aerials	<a href="#">H04B 7/04</a>
--	---------------------------

## H02J 50/50

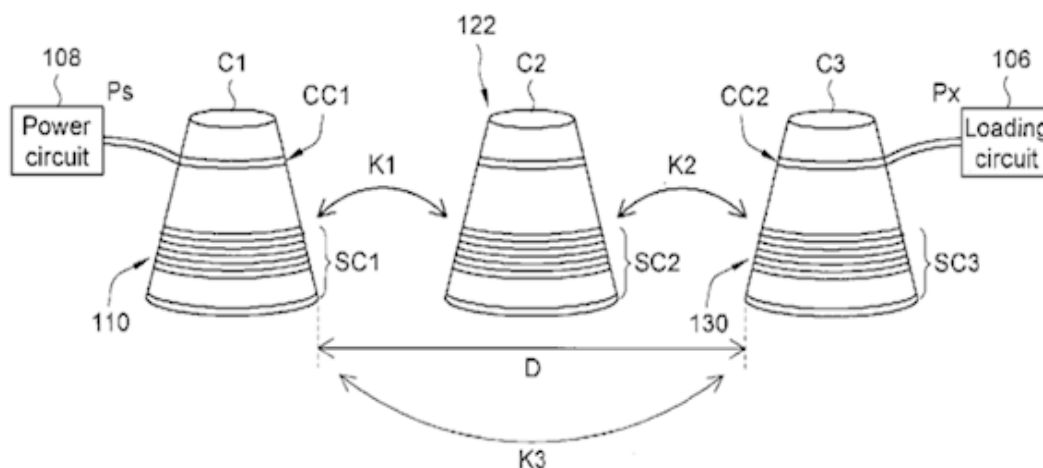
**using additional energy repeaters between transmitting devices and receiving devices**

### Definition statement

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power using additional energy repeaters between transmitting devices and receiving devices. The repeater(s) must be physically located between the transmitting devices the receiving devices, and must be separate from them.

The figure below is an example falling within the scope of this subgroup. In the figure, the repeater C2 repeats electric power transmission between the transmitting device C1 and the receiving device C3.



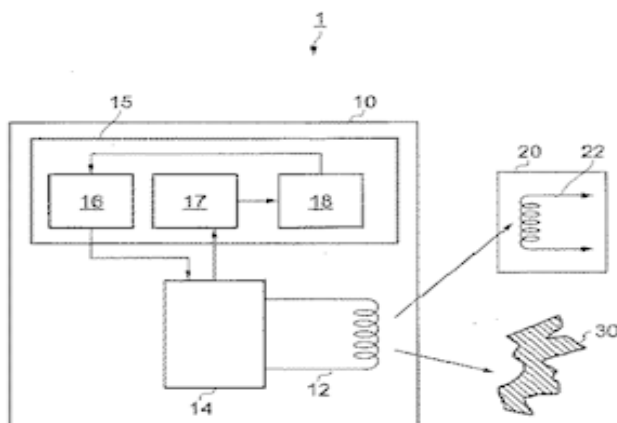
## H02J 50/60

responsive to the presence of foreign objects, e.g. detection of living beings

### Definition statement

*This place covers:*

The figure below is an illustrative example for this subgroup. In the figure, the transmitting device 10 detects the presence of the foreign object 30.



### Relationships with other classification places

Mechanical aspects related to mechanical removing of foreign object are classified in the relevant field of technology.

### References

#### Informative references

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

Detection of object presence using reflection of radio waves	<a href="#">G01S 13/04</a>
Detection of object presence using reflection of acoustic waves	<a href="#">G01S 15/04</a>
Electric or magnetic detection of objects	<a href="#">G01V 3/08</a> ; <a href="#">G01V 3/15</a>
Optical detection of objects	<a href="#">G01V 8/10</a>

## H02J 50/70

involving the reduction of electric, magnetic or electromagnetic leakage fields

### References

#### Informative references

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

Details of transformers or inductances - special means for preventing or reducing unwanted electric or magnetic effects, e.g. leakage fields	<a href="#">H01F 27/34</a>
Devices for absorbing waves radiated from an aerial	<a href="#">H01Q 17/00</a>
Suppression or limitation of noise or interference	<a href="#">H04B 15/02</a>
Screening of apparatus or components against electric or magnetic fields	<a href="#">H05K 9/00</a>

**H02J 50/80**

**involving the exchange of data, concerning supply or distribution of electric power, between transmitting devices and receiving devices**

**References****Informative references**

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

IC cards	<a href="#">G06K 19/07</a>
Transmitting signals characterised by the use of a wireless electrical link	<a href="#">G08C 17/00</a>
Non-electric signal transmission systems	<a href="#">G08C 23/00</a>
Responders; (passive) Transponders	<a href="#">H04B 1/59</a>
Near-field transmission systems, e.g. inductive loop type	<a href="#">H04B 5/00</a>
Transmission systems employing electromagnetic waves other than radio-waves	<a href="#">H04B 10/00</a>

**H02J 50/90**

**involving detection or optimisation of position, e.g. alignment**

**Definition statement**

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power electrically detecting and/or optimising the relative position between emitters, receivers and repeaters, aiming to increase the efficiency of the wireless power transmission, wherein active parts of these circuit arrangements or systems, e.g. coils or antennas, are involved in the detection and/or optimising of the position.

**References****Informative references**

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

Detection of object position using reflection of radio waves	<a href="#">G01S 13/06</a>
Detection of object position using reflection or reradiation of electromagnetic waves other than radio waves	<a href="#">G01S 17/06</a>
Control of position of vehicles, e.g. automatic pilot	<a href="#">G05D 1/00</a>
Position control	<a href="#">G05D 3/00</a>



**H02J 2101/25****{involving maximum power point tracking control for photovoltaic sources}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Regulating electric power to the maximum power available from a generator, e.g. from solar cell	<a href="#">G05F 1/67</a>
---	---------------------------

**H02J 2101/28****Wind energy****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Wind motors	<a href="#">F03D</a>
-------------	----------------------

**H02J 2207/50****Charging of capacitors, supercapacitors, ultra-capacitors or double layer capacitors****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Parallel operation in networks using capacitors as storage or buffering devices and other DC sources	<a href="#">H02J 7/345</a>
--	----------------------------