

## H02J

**CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS FOR STORING ELECTRIC ENERGY (for digital computers [G06F 1/18](#); circuits or apparatus for the conversion of electric power, arrangements for control or regulation of such circuits or apparatus [H02M](#); interrelated control of several motors, control of a prime-mover/generator combination [H02P](#); control of high-frequency power [H03L](#); additional use of power line or power network for transmission of information [H04B](#))**

### 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 co-ordinated 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

#### Limiting references

*This place does not cover:*

Vessels networks	<a href="#">B63J</a>
Aircraft networks	<a href="#">B64D</a>
Power supplies for movable barriers, electric doors, electric sunshades	<a href="#">E06B</a>
Circuit arrangements for digital computers	<a href="#">G06F 1/18</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 of a single motor or generator, of the types covered by subclass <a href="#">H02N</a>	<a href="#">H02N</a>
Control of a single motor or generator	<a href="#">H02P</a>
Control of high-frequency power	<a href="#">H03L</a>

#### Informative references

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

Additional use of power line or power network for transmission of information	<a href="#">H04B</a>
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### Special rules of classification

Claimed devices, systems, and methods always have to be classified. If there is additional information disclosed, then at least an Indexing Code for additional information must be allocated.

If an orthogonal indexing code of the **H02J2000/00**-series (only for additional information) is given, it must always be accompanied by a regular classification symbol under [H02J](#), for invention or additional information. If not, the retrieval of the document turns more complicated. For example if a document gets the code [H02J 2003/001](#) only, the document will not be automatically retrieved when checking

the documents having [H02J 3/00](#) as additional information. On practice, the document will not be considered part of the [H02J 3/00](#) collection.

For example a battery protection circuitry in a docking station requires at least an Indexing Code [H02J 7/0044](#) besides the group symbol [H02J 7/0029+](#).

## 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
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## H02J 1/00

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

#### References

##### Limiting references

*This place does not cover:*

Power supplies for vehicle components	<a href="#">B60R 16/00</a>
Power supplies for memories	<a href="#">G05G</a>
Power supplies for computers	<a href="#">G06F 1/00</a>
Fuel cells	<a href="#">H01M 8/00</a>
Load protection by tripping of the load for dc systems	<a href="#">H02H</a>
Details for dc/dc converters	<a href="#">H02M 3/00</a>
Power supplies for dc lamps	<a href="#">H05B 37/00</a>

#### Special rules of classification

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

<a href="#">H02J 2001/002</a>	dc supply with intermediated ac distribution
<a href="#">H02J 2001/008</a>	dc supply with at least two different dc voltage levels (e.g: 14V and 42V in certain vehicles)
<a href="#">H02J 2001/004</a>	use of fuel cells for ac or dc power generation (e. g. for UPS, load balancing, economic power management...)
<a href="#">H02J 2001/006</a>	Provisions for temporary connection of dc sources of essentially the same voltage, e.g. jumpstart cables, etc.

## H02J 1/02

### Arrangements for reducing harmonics or ripples (in converters [H02M 1/14](#))

#### References

##### Limiting references

*This place does not cover:*

Arrangements for reducing harmonics or ripples in converters	<a href="#">H02M 1/14</a>
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## H02J 1/10

### Parallel operation of dc sources (involving batteries [H02J 7/34](#))

#### 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

##### Limiting references

*This place does not cover:*

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

{using diodes blocking reverse current flow ([H02J 1/12](#) takes precedence)}

### References

#### Limiting references

*This place does not cover:*

Parallel operation of dc generators with converters, e.g. with mercury-arc rectifier	<a href="#">H02J 1/12</a>
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## H02J 1/14

Balancing the load in a network (by batteries [H02J 7/34](#))

### 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

### References

#### Limiting references

*This place does not cover:*

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

### Limiting references

*This place does not cover:*

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>
Photovoltaic panel	<a href="#">H01L 31/00</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>

### Informative references

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

When searching in <b>H0J3/00T</b> see also computer systems for trading	<a href="#">G06Q 30/00</a>
<a href="#">H02J 3/38</a> : Parallel connections of dc/ac converters	<a href="#">H02M 7/493</a>
When searching in <b>H0J3/36</b>	<a href="#">H02M 7/7575</a>

### Special rules of classification

The Indexing Code [H02J 3/32](#) and/or [H02J 3/008](#) is assigned for covering the idea of using parked electric vehicle batteries for feeding the network during peak times and/or selling energy.

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

<a href="#">H02J 2003/003</a>	methods and systems for forecasting future load demands
<a href="#">H02J 2003/001</a>	methods to deal with contingencies in the widest meaning
<a href="#">H02J 2003/002</a>	compensation of flicker introduced by nonlinear loads
<a href="#">H02J 2003/007</a>	planning, simulating, CAD, modelling, reliability checks, etc.
<a href="#">H02J 2003/143</a>	household appliances management
<a href="#">H02J 2003/146</a>	switching loads on and off in function of energy prices
<a href="#">H02J 2003/365</a>	means for the reduction or elimination of harmonics or oscillations in high voltage dc link (hvdc)
<a href="#">H02J 2003/388</a>	Disconnection of a local power supply from the network

**H02J 3/005**

{Arrangements for selectively connecting the load to one among a plurality of power lines or power sources (for providing uninterruptable power supply [H02J 9/00](#))}

**References****Limiting references**

*This place does not cover:*

Arrangements for providing uninterruptable power supply	<a href="#">H02J 9/00</a>
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**H02J 3/01**

Arrangements for reducing harmonics or ripples (in converters [H02M 1/12](#))

**References****Limiting references**

*This place does not cover:*

Arrangements for reducing harmonics or ripples in converters	<a href="#">H02M 1/12</a>
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**H02J 3/06**

Controlling transfer of power between connected networks; Controlling sharing of load between connected networks

**References****Limiting references**

*This place does not cover:*

Controlling transfer of power, sharing load between a generator and the connected network	<a href="#">H02J 3/38</a>
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**H02J 3/18**

Arrangements for adjusting, eliminating, or compensating reactive power in networks (for adjustment of voltage [H02J 3/12](#); use of Petersen coils [H02H 9/08](#))

**References****Informative references**

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

Arrangements for adjustment of voltage	<a href="#">H02J 3/12</a>
Arrangements for use of Petersen coils	<a href="#">H02H 9/08</a>

## H02J 3/1842

{wherein at least one reactive element is actively controlled by a bridge converter, e.g. active filters}

### References

#### Informative references

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

if the bridge combines both series and shunt compensators	<a href="#">H02J 3/1814</a>
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## H02J 3/24

Arrangements for preventing or reducing oscillations of power in networks (by control effected upon a single generator [H02P 9/00](#))

### Definition statement

*This place covers:*

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

### References

#### Limiting references

*This place does not cover:*

Control effected upon a single generator	<a href="#">H02P 9/00</a>
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## H02J 3/38

Arrangements for parallely feeding a single network by two or more generators, converters or transformers

### References

#### Limiting references

*This place does not cover:*

Parallel connections of dc/ac converters not for feeding a network, but a local load	<a href="#">H02M 7/493</a>
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## H02J 4/00

Circuit arrangements for mains or distribution networks not specified as ac or dc

### Definition statement

*This place covers:*

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

## H02J 5/00

**Circuit arrangements for transfer of electric power between ac networks and dc networks ([H02J 3/36](#) takes precedence)**

### 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 here.

### References

#### Limiting references

*This place does not cover:*

Circuit arrangements for dc mains or dc distribution networks	<a href="#">H02J 1/00</a>
Arrangements for balancing of the load in a network by storage of energy using batteries with converting means	<a href="#">H02J 3/32</a>
Arrangements for transfer of electric power between ac networks via a high-tension dc link	<a href="#">H02J 3/36</a>
Arrangements for parallelly feeding a single network by two or more generators, converters or transformers	<a href="#">H02J 3/38</a>
Details for sending and receiving coils	<a href="#">H01F</a>
Ac/dc or dc/ac converters	<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 belongs to [H02J 3/38](#) and not to [H02J 5/00](#), even if a dc to ac transfer is involved.

## H02J 5/005

**{with inductive power transfer (for charging [H02J 7/025](#))}**

### Definition statement

*This place covers:*

Circuit arrangements for transfer of electric power between ac networks and dc networks by inductive transfer, i.e. the sending coil being part of the source and the receiving coil being part of the load and coupling is in the near field region.

### References

#### Informative references

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

Transmission involving transformers	<a href="#">H02J 3/00</a>
Transmission by means of electromagnetic waves, e.g. microwave, RF, and far-field inductive coupling. In practice, long distance wireless transmission	<a href="#">H02J 50/00</a>
Near-field transmission systems, e.g. inductive loop type	<a href="#">H04B 5/00</a>

## Special rules of classification

[H02J 5/005](#) should be allocated even, if the power source is not ac mains or if it is not better specified. For example, if the power source is a fuel cell, [H02J 5/005](#) has to be allocated, and additionally [H02J 2001/004](#)

With regard to wireless power transfer vs wireless battery charging; any document with relevant technical features about near-field inductive power transfer, should come here. If it is involved in battery charging, then double classification under [H02J 7/025](#) must be considered.

## H02J 7/00

### Circuit arrangements for charging or depolarising 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

##### Limiting references

*This place does not cover:*

Charging electric/hybrid vehicles	<a href="#">B60L</a> , <a href="#">B60K</a>
Electrical circuits for vehicles	<a href="#">B60R</a>
Vehicle starting circuits	<a href="#">F02D</a>
Testing of batteries	<b>G01R36/00</b>
Batteries mechanical, chemical details	<a href="#">H01M</a>
Mechanical details of battery charger alternators	<a href="#">H02K</a>
Details of converter	<a href="#">H02M</a>
Perpetuum mobile	<a href="#">H02N</a>
Control of alternators	<a href="#">H02P 9/00</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:*

For over-discharge protection	<a href="#">H02H 7/18</a>
Near-field transmission systems, e.g. inductive loop type	<a href="#">H04B 5/00</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 Indexing Code [H02J 7/345](#) and CPC group symbols, which would apply, if the capacitor was replaced with a battery.

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

<a href="#">H02J 2001/002</a>	Circuits in which a system component (battery, battery charger...) checks compatibility with another component (power source...)
<a href="#">H02J 2007/0067</a>	managing load supply from one or more batteries, e.g.: discharge current reduction at low state of charge, sequential battery discharge in plural battery systems
<a href="#">H02J 2007/0095</a>	means for power supply of control circuit
<a href="#">H02J 2007/0096</a>	charger exchanges data with telephone or electronic device whose internal battery are being charged
<a href="#">H02J 2007/0098</a>	data exchange between smart battery and charger
<a href="#">H02J 2007/0037</a>	overcharge protection
<a href="#">H02J 2007/0039</a>	overcurrent protection
<a href="#">H02J 2007/004</a>	overdischarge protection
<a href="#">H02J 2007/0049</a>	detection of fully charged condition
<a href="#">H02J 2007/005</a>	remaining charge detection
<a href="#">H02J 2007/0059</a>	characterised by the converter
<a href="#">H02J 2007/006</a>	charge provided using dc bus or data bus of computer
<a href="#">H02J 2007/0062</a>	charge provided using USB port connectors
<a href="#">H02J 2007/0095</a>	means for power supply of control circuit
<a href="#">H02J 2007/0096</a>	charger exchanges data with telephone or electronic device whose internal battery are being charged
<a href="#">H02J 2007/0098</a>	data exchange between smart battery and charger
<a href="#">H02J 2007/143</a>	multiple generators

## H02J 7/0027

{Stations for charging mobile units, e.g. of electric vehicles, of mobile telephones ([H02J 7/0021](#), [H02J 7/0026](#) take precedence)}

### Definition statement

*This place covers:*

Battery charging characterized by a physical or electrical arrangement allowing the simultaneous charge of a plurality, i.e. two or more, of mobile units, e.g. mobile phones, machine-tools or electric/hybrid vehicles.

### References

#### Limiting references

*This place does not cover:*

Monitoring or indicating circuits	<a href="#">H02J 7/0021</a>
Safety or protection circuits, e.g. overcharge/discharge disconnection	<a href="#">H02J 7/0026</a>
Details of stations for charging electric vehicles, e.g. vehicle recognition or identification, billing or payment, charging columns for electric vehicles, automatic adjustment of relative position, vehicle to grid (V2G) arrangements.	<a href="#">B60L 11/1809</a>

## H02J 7/0077

{the charge cycle being terminated in response to electric parameters  
([H02J 7/0093](#) takes precedence)}

### Definition statement

*This place covers:*

- Controlling charge in response to current
- Controlling charge in response to voltage
- Controlling charge in response to both current and voltage

### References

#### Limiting references

*This place does not cover:*

Regulation of charging current or voltage with introduction of pulses during the charging process	<a href="#">H02J 7/0093</a>
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### Synonyms and Keywords

In the definition [H02J 7/0077](#) and subgroups the word "terminated" has to be interpreted as "controlled"

## H02J 7/025

{using non-contact coupling, e.g. inductive, capacitive}

### Definition statement

*This place covers:*

Non-contact coupling, i.e. the sending coil or the first capacitor plate being part of the supplying source and the receiving coil or the second capacitor plate being part of the energy receiving circuit and coupling is in the near field region.

### References

#### Informative references

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

Near-field transmission systems, e.g. inductive loop type	<a href="#">H04B 5/00</a>
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### Special rules of classification

The classification symbol [H02J 7/025](#) should be given even if the charging source is not ac mains or if it is unspecified. For example, if the charging source is a photovoltaic cell, classification is made in [H02J 7/35](#) and additionally in [H02J 7/025](#). Features regarding wireless power transfer itself are classified under [H02J 50/00](#).

## 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 balancing of the load in an AC network by storing energy using batteries with converting means	<a href="#">H02J 3/32</a>
Circuit arrangements for charging batteries from dynamo-electric generators driven at varying speed	<a href="#">H02J 7/14</a>

## H02J 9/00

**Circuit arrangements for emergency or standby power supply, e.g. for emergency lighting (with provision for charging standby battery [H02J 7/00](#))**

### 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). It is common practice (even at IPC level) to classify them under [H02J 9/00](#)

### References

#### Limiting references

*This place does not cover:*

Circuit arrangement for emergency or standby power supply 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 37/00</a>

### Special rules of classification

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

<a href="#">H02J 2009/007</a>	power saving operation when no load is present
<a href="#">H02J 2009/063</a>	common neutral

<a href="#">H02J 2009/067</a>	using a single transformer with multiple primaries (one for each ac energy source) and a secondary for the loads
<a href="#">H02J 2009/068</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>
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## H02J 9/061

**{characterised by the use of electronic means ([H02J 9/062](#) and [H02J 9/065](#) take precedence)}**

### 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. Since [H02J 9/062](#) and [H02J 9/065](#) take precedence, in practice, this code covers UPS with a DC output

### References

#### Limiting references

*This place does not cover:*

Electronic means consisting of non rotating dc/ac converter, e.g. UPS with an AC output	<a href="#">H02J 9/062</a>
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## H02J 11/00

**Circuit arrangements for providing service supply to auxiliaries of stations in which electric power is generated, distributed, or converted (emergency or standby arrangements [H02J 9/00](#))**

### References

#### Limiting references

*This place does not cover:*

Emergency or standby arrangements	<a href="#">H02J 9/00</a>
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## H02J 13/00

**Circuit arrangements for providing remote indication of network conditions, e.g. an instantaneous record of the open or closed condition of each circuitbreaker in the network; Circuit arrangements for providing remote control of switching means in a power distribution network, e.g. switching in and out of current consumers by using a pulse code signal carried by the network {(circuits for indication of single switches [H01H 9/167](#); circuits specially adapted for remote switching of lighting via the power line [H05B 37/0263](#))}**

### Definition statement

*This place covers:*

[H02J 13/00](#) 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

#### Limiting references

*This place does not cover:*

Electricity meters involved (in particular smart meters)	<a href="#">G01D 4/00</a>
Measuring of electrical variables)	<a href="#">G01R</a>
Power strips with locally controlled on/off capability for computers	<a href="#">G06F 1/266</a>
Remote operation of appliances	<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>
Telemetry	<a href="#">H04Q 9/00</a>
Remote switching of lightings	<a href="#">H05B 37/00</a>

Circuits specially adapted for remote switching of lighting via the power line	<a href="#">H05B 37/0263</a>
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### Informative references

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

Monitoring	<a href="#">G05B 15/02</a>
Programmed control systems	<a href="#">G05B 19/00</a>
Computer aided design (CAD), simulation, modelling	<a href="#">G06F 17/00</a>
Computing for organisational, economical, commercial, marketing purposes	<a href="#">G06Q</a>
Measured data transmission systems	<a href="#">G08C</a>
Communication using power lines (PLC, power line carrier)	<a href="#">H04B 3/00</a>
Details of data switching networks	<a href="#">H04L 12/2803</a>

## H02J 15/00

**Systems for storing electric energy (mechanical systems therefor [F01](#) - [F04](#); in chemical form [H01M](#))**

### 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:*

Conjoint control of energy storage in vehicles	<a href="#">B60W 10/00</a>
Details of mechanical systems	<a href="#">F01</a> - <a href="#">F04</a>
Details of accumulators for supplying fluids under pressure	<a href="#">F15B 1/04</a>
Thermal storage - cold	<a href="#">F24F 5/00</a>
Thermal storage - heaters	<a href="#">F24H 7/00</a>
Thermal storage - heat	<a href="#">F28D 20/00</a>
Capacitors	<a href="#">H01G</a>
Batteries mechanical, chemical details	<a href="#">H01M</a>
Fly-wheel generators	<a href="#">H02K 7/02</a>

**Informative references**

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

Arrangements for balancing of the load in an AC network by storage of energy	<a href="#">H02J 3/28</a>
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**H02J 17/00****Systems for supplying or distributing electric power by electromagnetic waves****References****Limiting references**

This place does not cover:

Near-field transmission systems	<a href="#">H04B 5/00</a>
Antennas, e.g. rectennas, i.e. antennas for power transfer	<a href="#">H04Q</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.

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.

**Synonyms and Keywords**

In patent documents, the following abbreviations are often used:

WPT	Wireless Power Transfer
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In patent documents, the following words/expressions are often used as synonyms:

wireless power transmission, wireless energy transmission, wireless power transfer, contactless power transfer, cordless power transfer.

## H02J 50/05

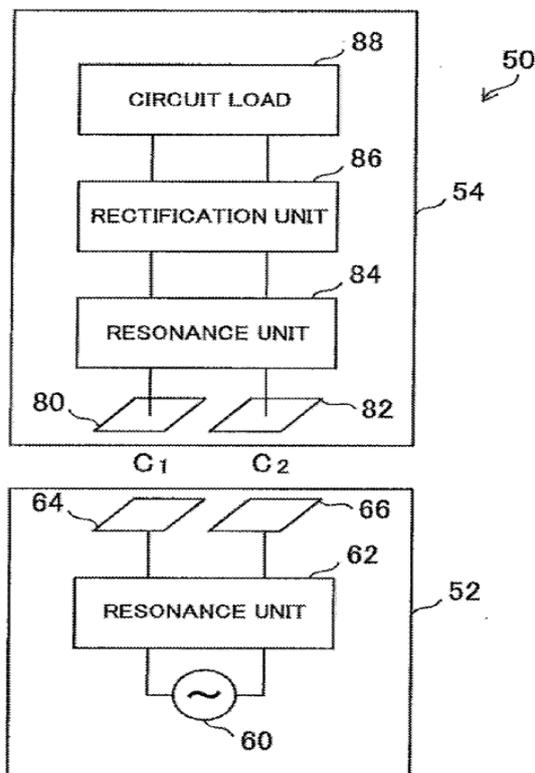
### using capacitive coupling

#### 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>
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## H02J 50/10

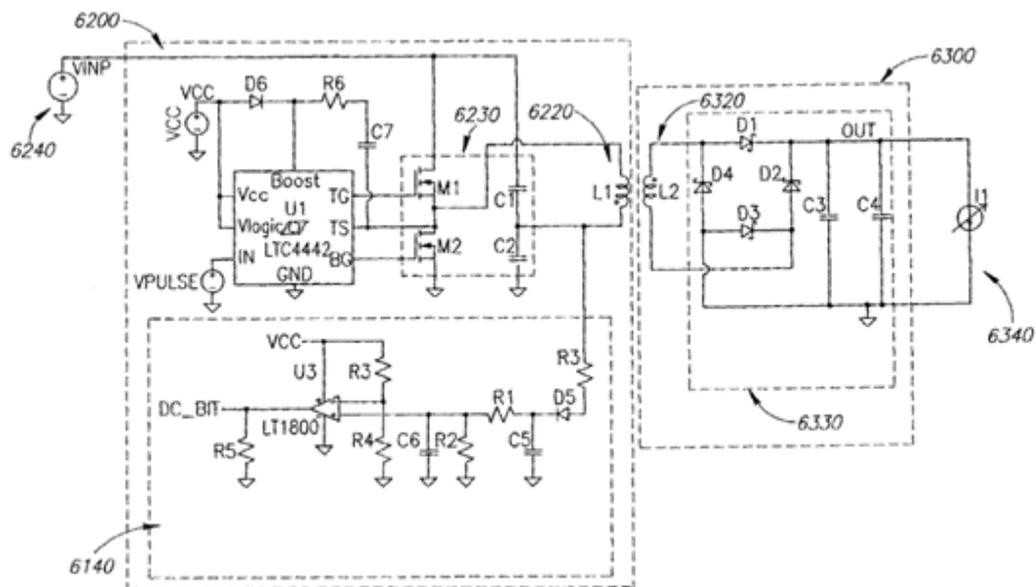
### using inductive coupling

#### 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

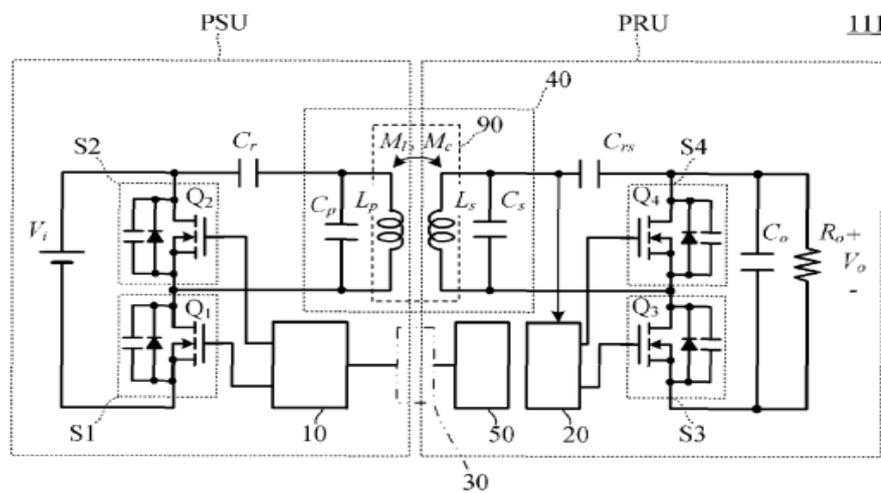
#### Definition statement

*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

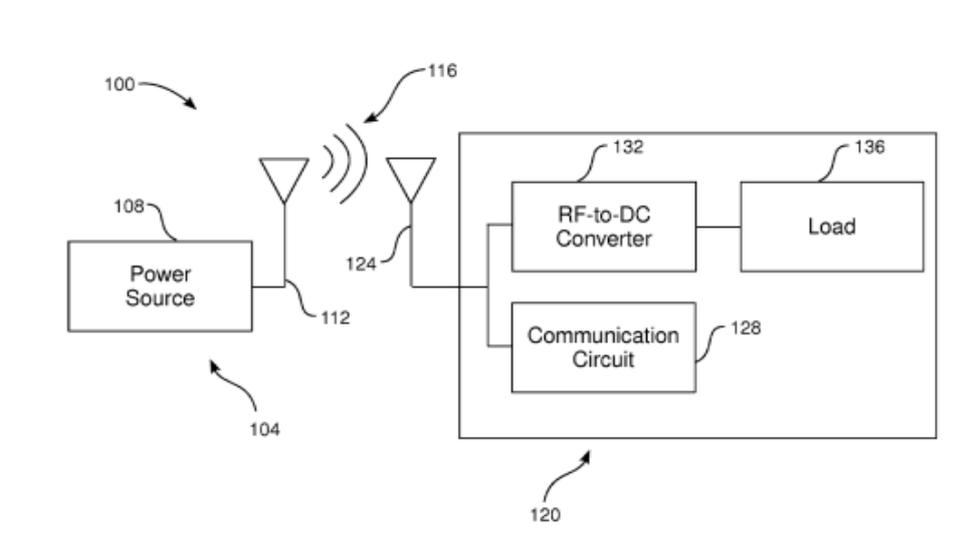
### using microwaves or radio frequency waves

#### Definition statement

*This place covers:*

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

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

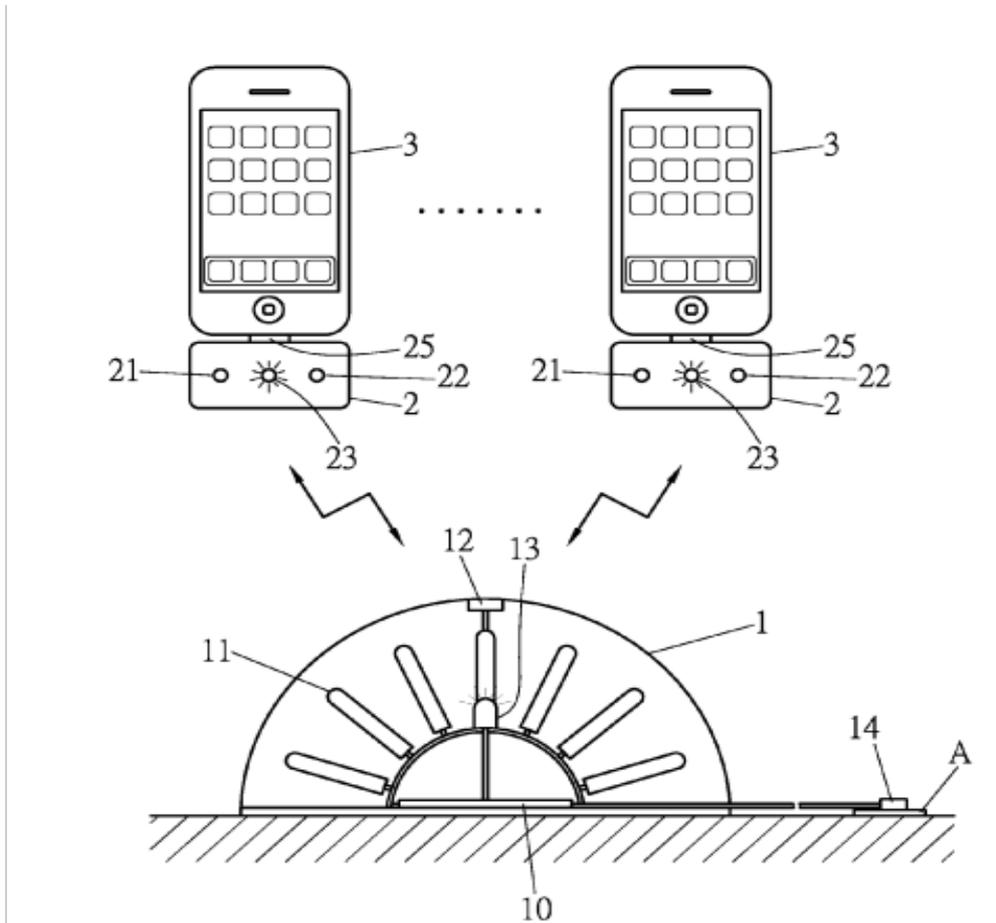
### characterised by the type of transmitting antennas, e.g. directional array antennas or Yagi antennas

#### 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

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**

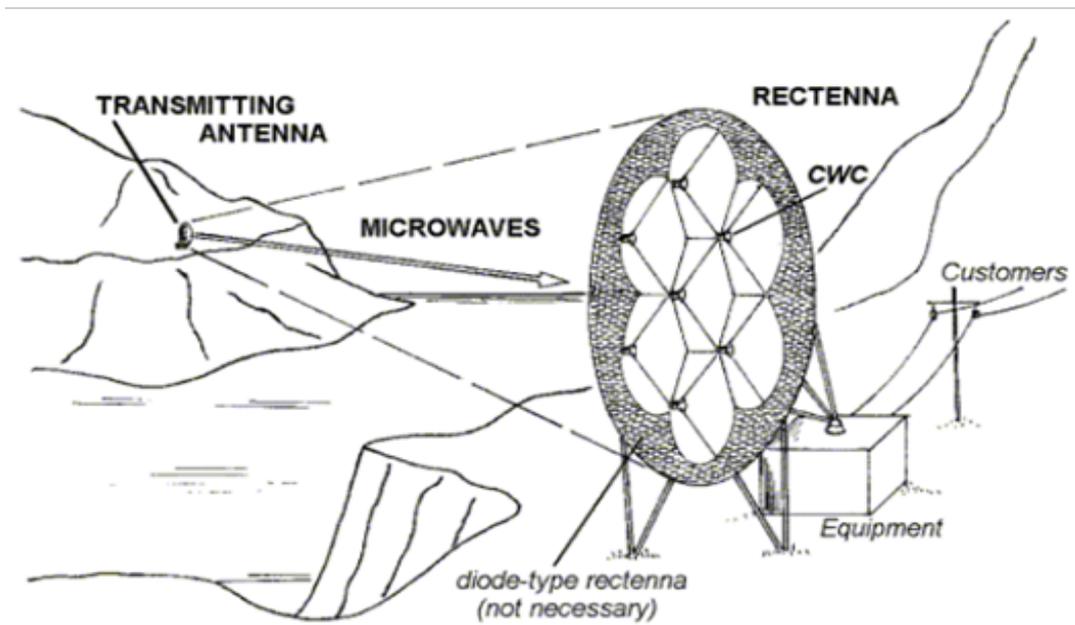
**characterised by the type of receiving antennas, e.g. rectennas**

**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

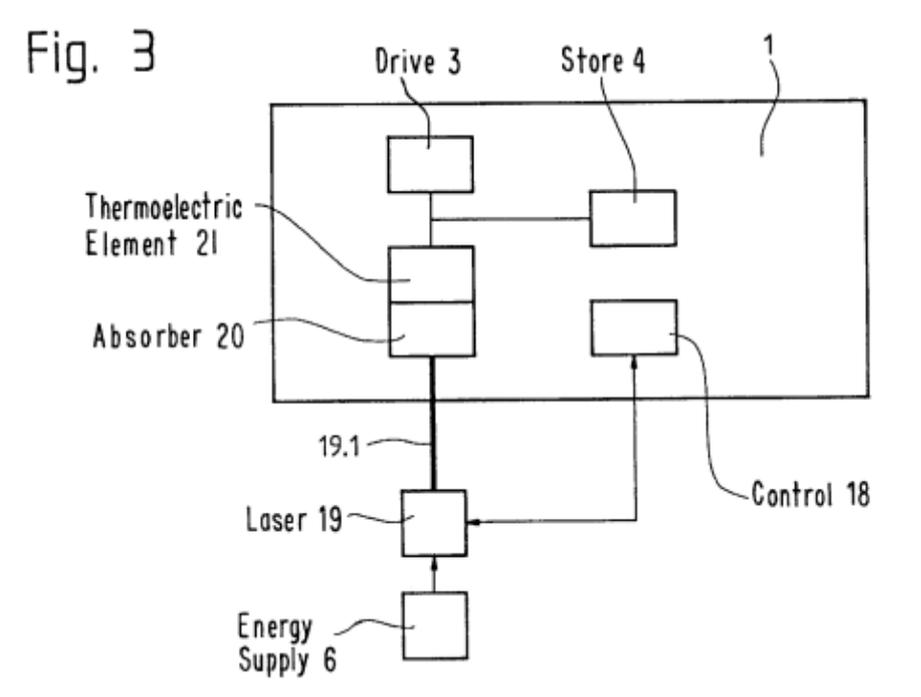
### Definition statement

*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**

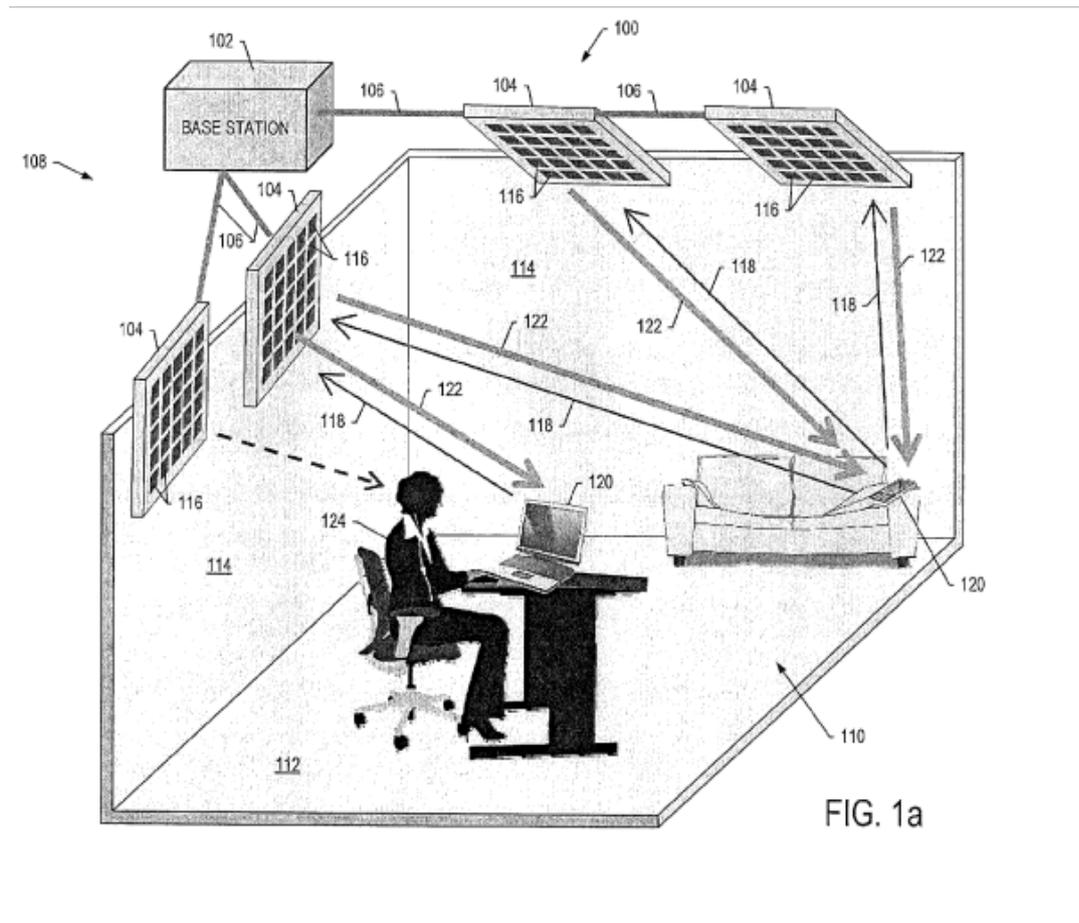
using two or more transmitting or receiving devices ([H02J 50/50](#) takes precedence)

**Definition statement**

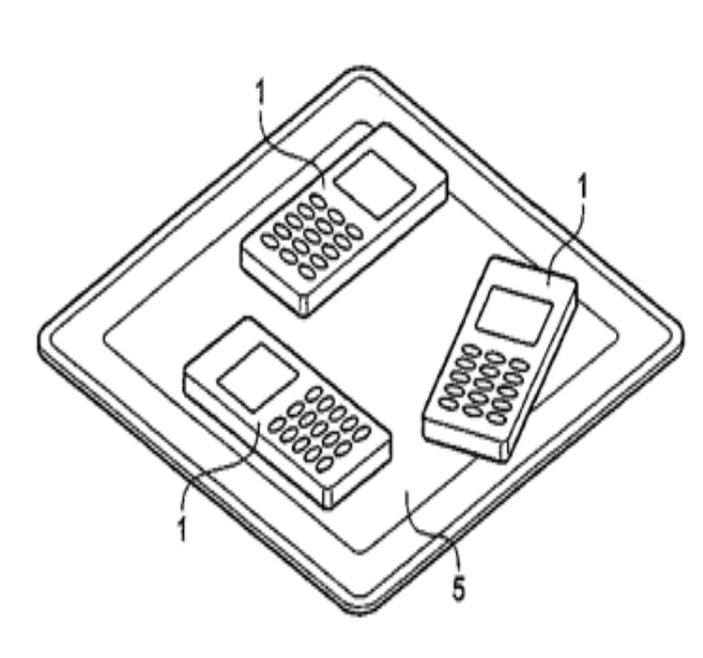
*This place covers:*

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>
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**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>
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**H02J 50/50**

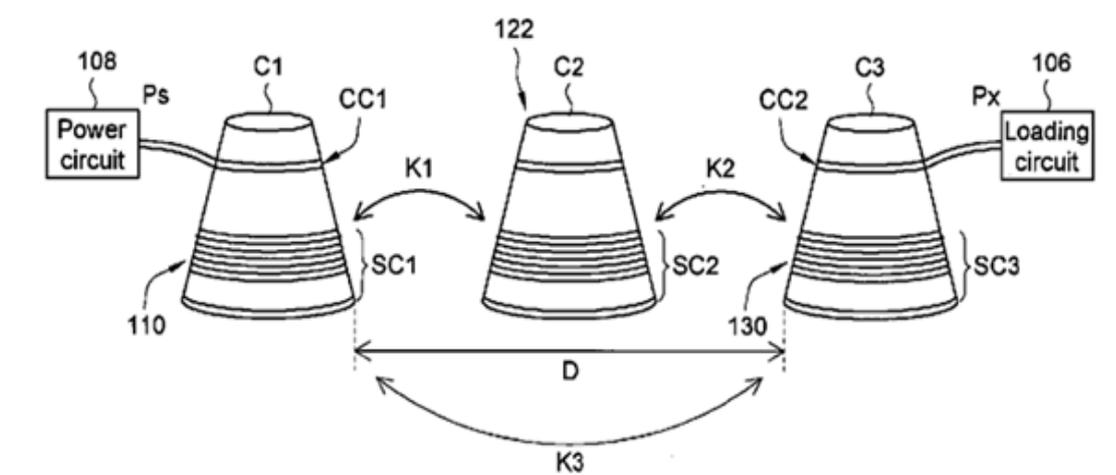
**using additional energy repeaters between transmitting devices and receiving devices**

**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**

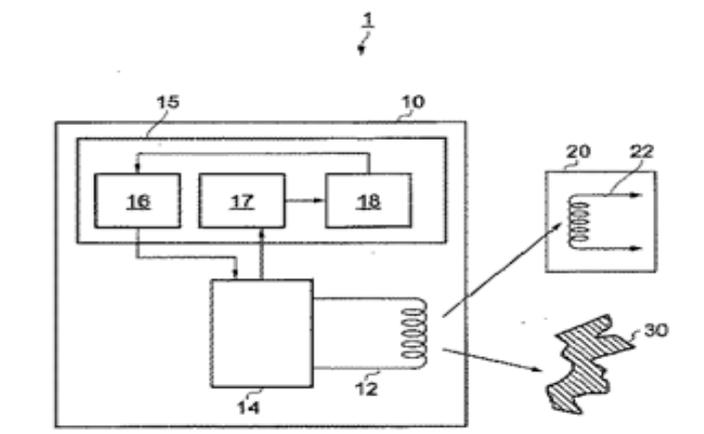
**responsive to the presence of foreign objects, e.g. detection of living beings**

**Definition statement**

*This place covers:*

Circuit arrangements or systems for wireless supply or distribution of electric power responsive to the presence of foreign objects, wherein active parts of these circuit arrangements or systems, e.g. coils or antennas, are involved in the detection of, or the response to the presence of, foreign objects.

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>