# CPC COOPERATIVE PATENT CLASSIFICATION

## B PERFORMING OPERATIONS; TRANSPORTING

*(NOTES omitted)*

## SEPARATING; MIXING

## B03 SEPARATION OF SOLID MATERIALS USING LIQUIDS OR USING PNEUMATIC TABLES OR JIGS; MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS

## B03C MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS (separating isotopes B01D 59/00; combinations of magnetic or electrostatic separation with separation of solids by other means B03B, B07B)

**WARNING**

{In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.}

**1/00 Magnetic separation**

1/002 . {High gradient magnetic separation}
1/005 . Pretreatment specially adapted for magnetic separation
1/01 . . by addition of magnetic adjuvants
1/015 . . by chemical treatment imparting magnetic properties to the material to be separated, e.g. roasting, reduction, oxidation
1/02 . acting directly on the substance being separated
1/021 . . Separation using Meissner effect, i.e. deflection of superconductive particles in a magnetic field
1/023 . . Separation using Lorentz force, i.e. deflection of electrically charged particles in a magnetic field
1/025 . . High gradient magnetic separators
1/027 . . . with reciprocating canisters
1/029 . . . with circulating matrix or matrix elements
1/03 . . . . rotating, e.g. of the carousel type
1/031 . . . Component parts; Auxiliary operations
1/032 . . . . Matrix cleaning systems
1/033 . . . . characterised by the magnetic circuit
1/0332 . . . . . {using permanent magnets}
1/0335 . . . . . {using coils}
1/0337 . . . . . {superconductive}
1/034 . . . . . characterised by the matrix elements
1/035 . . Open gradient magnetic separators, i.e. separators in which the gap is unobstructed, characterised by the configuration of the gap
1/0355 . . . using superconductive coils
1/04 . . with the material carriers in the form of trays or with tables
1/06 . . . with magnets moving during operation
1/08 . . . with non-movable magnets
1/10 . . with cylindrical material carriers (B03C 1/247 takes precedence)
1/12 . . . with magnets moving during operation; with movable pole pieces
1/14 . . . with non-movable magnets
1/145 . . . . {with rotating annular or disc-shaped material carriers}
1/16 . . with material carriers in the form of belts
1/18 . . . with magnets moving during operation
1/20 . . . . in the form of belts, e.g. cross-belt type
1/22 . . . with non-movable magnets
1/23 . . with material carried by oscillating fields; with material carried by travelling fields, e.g. generated by stationary magnetic coils; Eddy-current separators, e.g. sliding ramp
1/24 . . . with material carried by travelling fields
1/247 . . . . obtained by a rotating magnetic drum
1/253 . . . . obtained by a linear motor
1/26 . . with free falling material (B03C 1/035 takes precedence)
1/28 . . Magnetic plugs and dipsticks
1/282 . . . {with associated accumulation indicator, e.g. Hall sensor}
1/284 . . . {with associated cleaning means, e.g. retractable non-magnetic sleeve}
1/286 . . . {disposed at the inner circumference of a recipient, e.g. magnetic drain bolt}
1/288 . . . {disposed at the outer circumference of a recipient}
1/30 . . Combinations with other devices, not otherwise provided for
1/32 . acting on the medium containing the substance being separated, e.g. magneto-gravimetric-, magnetohydrostatic-, or magnetohydrodynamic separation

**3/00 Separating dispersed particles from gases or vapour, e.g. air, by electrostatic effect**

3/01 . Pretreatment of the gases prior to electrostatic precipitation
3/011 . . Prefiltering; Flow controlling
3/013 . . Conditioning by chemical additives, e.g. with $SO_3$

3/014 . . Addition of water; Heat exchange, e.g. by condensation
3/016 . . by acoustic or electromagnetic energy, e.g. ultraviolet light
3/017 . Combinations of electrostatic separation with other processes, not otherwise provided for
3/0175 . . {Amassing particles by electric fields, e.g. agglomeration}
3/019 . Post-treatment of gases
3/02 . Plant or installations having external electricity supply
3/025 . . {Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations}
3/04 . . dry type
3/06 . . . characterised by presence of stationary tube electrodes
3/08 . . . characterised by presence of stationary flat electrodes arranged with their flat surfaces parallel to the gas stream
3/09 . . . characterised by presence of stationary flat electrodes arranged with their flat surfaces at right angles to the gas stream
3/10 . . . characterised by presence of electrodes moving during separating action
3/12 . . . characterised by separation of ionising and collecting stations
3/14 . . . characterised by the additional use of mechanical effects, e.g. gravity (B03C 3/32 takes precedence)
3/145 . . . . Inertia
3/15 . . . . Centrifugal forces
3/155 . . . . Filtration
3/16 . . wet type
3/28 . Plant or installations without electricity supply, e.g. using electrets
3/30 . . in which electrostatic charge is generated by passage of the gases, i.e. tribo-electricity
3/32 . Transportable units, e.g. for cleaning room air
3/34 . Constructional details or accessories or operation thereof
3/36 . . Controlling flow of gases or vapour
3/361 . . . {by static mechanical means, e.g. deflector}
3/363 . . . . {located before the filter}
3/365 . . . . {located after the filter}
3/366 . . . . {located in the filter, e.g. special shape of the electrodes}
3/368 . . . {by other than static mechanical means, e.g. internal ventilator or recycler}
3/38 . . Particle charging or ionising stations, e.g. using electric discharge, radioactive radiation or flames
3/383 . . . {using radiation}
3/386 . . . {using flames}
3/40 . . Electrode constructions
3/41 . . . Ionising-electrodes
3/43 . . . . radioactive
3/45 . . . Collecting-electrodes
3/455 . . . . {specially adapted for heat exchange with the gas stream (B03C 3/53 takes precedence)}
3/47 . . . . flat, e.g. plates, discs, gratings
3/49 . . . . tubular {(B03C 3/455 takes precedence)}
3/51 . . . . Catch- space electrodes, e.g. slotted-box form
3/53 . . . . Liquid, or liquid-film, electrodes
3/60 . . . Use of special materials other than liquids
3/62 . . . . ceramics
3/64 . . . . synthetic resins
3/66 . . Applications of electricity supply techniques
3/68 . . . Control systems therefor {(electricity supply or control systems for cleaning the electrodes B03C 3/746, B03C 3/763)}
3/70 . . . insulating in electric separators (B03C 3/53 takes precedence)
3/72 . . Emergency control systems
3/74 . . Cleaning the electrodes
3/743 . . . {by using friction, e.g. by brushes or sliding elements}
3/746 . . . . {Electricity supply or control systems therefor}
3/76 . . . by using a mechanical vibrator, e.g. rapping gear {; by using impact}
3/761 . . . . {Drive-transmitting devices therefor, e.g. insulated shafts}
3/763 . . . . {Electricity supply or control systems therefor}
3/765 . . . . {with electromagnetic rappers}
3/766 . . . . {with pneumatic rappers}
3/768 . . . . {with free falling masses, e.g. dropped metal balls}
3/78 . . . by washing
3/80 . . . by gas or solid particle blasting
3/82 . . Housings
3/84 . . . Protective coatings
3/86 . . Electrode-carrying means (B03C 3/40 takes precedence)
3/88 . . Cleaning-out collected particles
3/885 . . . {by travelling or oscillating electric fields, e.g. electric field curtains (electrostatic non-mechanical conveyors in general B65G 54/02)}

**5/00** **Separating dispersed particles from liquids by electrostatic effect** ({flocculation or agglomeration of electric particles induced by electric field B01D 21/0009;} combined with centrifuges B04B 5/10)

**NOTE**

In this group, the following term is used with the meaning indicated:
- "separating" means dimensional modifications of particle-liquid distributions, e.g. particle immobilisation, caging, translational or rotational motion

5/005 . {Dielectrophoresis, i.e. dielectric particles migrating towards the region of highest field strength (B03C 5/02 takes precedence; electrophoresis B01D 57/02)}
5/02 . Separators
5/022 . . {Non-uniform field separators}
5/024 . . . {using high-gradient differential dielectric separation, i.e. using a dielectric matrix polarised by an external field}
5/026 . . . {using open-gradient differential dielectric separation, i.e. using electrodes of special shapes for non-uniform field creation, e.g. Fluid Integrated Circuit [FIC]}

5/028 . . . {using travelling electric fields, i.e. travelling wave dielectrophoresis [TWD]}

**7/00 Separating solids from solids by electrostatic effect**

7/003 . {Pretreatment of the solids prior to electrostatic separation}

7/006 . {Charging without electricity supply, e.g. by tribo-electricity, pyroelectricity}

7/02 . Separators

7/023 . . {Non-uniform field separators}

7/026 . . . {using travelling or oscillating electric fields}

7/04 . . with material carriers in the form of trays, troughs, or tables

7/06 . . with cylindrical material carriers

7/08 . . with material carriers in the form of belts

7/10 . . with material falling in cascades

7/12 . . with material falling free

**9/00 Electrostatic separation not provided for in any single one of the other main groups of this subclass**

**11/00 Separation by high-voltage electrical fields, not provided for in other groups of this subclass**

**2201/00 Details of magnetic or electrostatic separation**

2201/02 . Electro-statically separating liquids from liquids

2201/04 . Ionising electrode being a wire

2201/06 . Ionising electrode being a needle

2201/08 . Ionising electrode being a rod

2201/10 . Ionising electrode has multiple serrated ends or parts

2201/12 . Cleaning the device by burning the trapped particles

2201/14 . the gas being moved electro-kinetically

2201/16 . Magnetic separating gases form gases, e.g. oxygen from air

2201/18 . Magnetic separation whereby the particles are suspended in a liquid

2201/20 . Magnetic separation whereby the particles to be separated are in solid form

2201/22 . characterised by the magnetical field, special shape or generation

2201/24 . for measuring or calculating parameters, efficiency, etc.

2201/26 . for use in medical applications

2201/28 . Parts being easily removable for cleaning purposes

2201/30 . for use in or with vehicles

2201/32 . Checking the quality of the result or the well-functioning of the device