

# 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** (separating isotopes [B01D 59/00](#); crushing or disintegrating [B02C](#); centrifuges or vortex apparatus for carrying out physical processes [B04](#))

**B03C MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS** (filters making use of electricity or magnetism [B01D 35/06](#); separating isotopes [B01D 59/00](#); combinations of magnetic or electrostatic separation with separation of solids by other means [B03B](#), [B07B](#); separating sheets from piles [B65H 3/00](#); magnets or magnet coils [per se H01F](#))

- |             |  |             |   |
|-------------|--|-------------|---|
| <b>1/00</b> | <b>Magnetic separation</b>   | 1/14        | . . . with non-movable magnets  |
| 1/002       | . {High gradient magnetic separation}  | 1/145       | . . . . {with rotating annular or disc-shaped material carriers}  |
| 1/005       | . Pretreatment specially adapted for magnetic separation   | 1/16        | . . with material carriers in the form of belts   |
| 1/01        | . . by addition of magnetic adjuvants  | 1/18        | . . . with magnets moving during operation  |
| 1/015       | . . by chemical treatment imparting magnetic properties to the material to be separated, e.g. roasting, reduction, oxidation           | 1/20        | . . . . in the form of belts, e.g. cross-belt type  |
| 1/02        | . acting directly on the substance being separated   | 1/22        | . . . with non-movable magnets  |
| 1/021       | . . Separation using Meissner effect, i.e. deflection of superconductive particles in a magnetic field                                 | 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  |
| 1/023       | . . Separation using Lorentz force, i.e. deflection of electrically charged particles in a magnetic field                              | 1/24        | . . . with material carried by travelling fields  |
| 1/025       | . . High gradient magnetic separators  | 1/247       | . . . . obtained by a rotating magnetic drum  |
| 1/027       | . . . with reciprocating canisters   | 1/253       | . . . . obtained by a linear motor  |
| 1/029       | . . . with circulating matrix or matrix elements (matrix elements <a href="#">B03C 1/034</a> )   | 1/26        | . . with free falling material ( <a href="#">B03C 1/035</a> takes precedence)   |
| 1/03        | . . . . rotating, e.g. of the carousel type  | 1/28        | . . Magnetic plugs and dipsticks  |
| 1/031       | . . . Component parts; Auxiliary operations  | 1/282       | . . . {with associated accumulation indicator, e.g. Hall sensor}  |
| 1/032       | . . . . Matrix cleaning systems  | 1/284       | . . . {with associated cleaning means, e.g. retractable non-magnetic sleeve}  |
| 1/033       | . . . . characterised by the magnetic circuit  | 1/286       | . . . {disposed at the inner circumference of a recipient, e.g. magnetic drain bolt}  |
| 1/0332      | . . . . . {using permanent magnets}  | 1/288       | . . . {disposed at the outer circumference of a recipient}  |
| 1/0335      | . . . . . {using coils}  | 1/30        | . . Combinations with other devices, not otherwise provided for   |
| 1/0337      | . . . . . {superconductive}  | 1/32        | . acting on the medium containing the substance being separated, e.g. magnetogravimetric-, magnetohydrostatic-, or magnetohydrodynamic separation {(sink-float separation using heavy liquids or suspensions <a href="#">B03B 5/30</a> )} |
| 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 | <b>3/00</b> | <b>Separating dispersed particles from gases or vapour, e.g. air, by electrostatic effect {(use of electrostatic separators in combination with exhausts of machines or internal combustion machines <a href="#">F01N 3/01</a>)}</b>      |
| 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 ( <a href="#">B03C 1/247</a> takes precedence)  |             |   |
| 1/12        | . . . with magnets moving during operation; with movable pole pieces   |             |   |

- 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<sub>3</sub>
- 3/014 . . Addition of water; Heat exchange, e.g. by condensation
- 3/016 . . by acoustic or electromagnetic energy, e.g. ultra-violet 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 (electrode constructions B03C 3/40)
- 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 (room air-conditioners having an electrostatic separating stage F24F)
- 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, flames (electrode constructions B03C 3/40; ionising gases H05H)
- 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
- 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; microreactors B01J 19/0093}; combined with centrifuges B04B 5/10{; treatment of microorganisms and apparatus therefor C12M 1/42, C12N 13/00, C12Q 1/24; analysis of biomaterial by electrical means G01N 33/48707})
- 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 triboelectricity, 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 a single preceding main group**

**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 from 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