

**CPC****COOPERATIVE PATENT CLASSIFICATION****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](#))

**B03C 1/00****Magnetic separation****B03C 1/002**

- . {High gradient magnetic separation}

**B03C 1/005**

- . Pretreatment specially adapted for magnetic separation

**B03C 1/01**

- .. by addition of magnetic adjuvants

**B03C 1/015**

- .. by chemical treatment imparting magnetic properties to the material to be separated, e.g. roasting, reduction, oxidation

**B03C 1/02**

- . acting directly on the substance being separated

**B03C 1/021**

- .. Separation using Meissner effect, i.e. deflection of superconductive particles in a magnetic field

**B03C 1/023**

- .. Separation using Lorentz force, i.e. deflection of electrically charged particles in a magnetic field

**B03C 1/025**

- .. High gradient magnetic separators

**B03C 1/027**

- ... with reciprocating canisters

**B03C 1/029**

- ... with circulating matrix or matrix elements ([matrix elements B03C 1/034](#))

**B03C 1/03**

- .... rotating, e.g. of the carousel type

**B03C 1/031**

- ... Component parts; Auxiliary operations

**B03C 1/032**

- .... Matrix cleaning systems

**B03C 1/033**

- .... characterised by the magnetic circuit

**B03C 1/0332**

- ..... {using permanent magnets}

**B03C 1/0335**

- ..... {using coils}

**B03C 1/0337**

- ..... {superconductive}

**B03C 1/034**

- ..... characterised by the matrix elements

**B03C 1/035**

- .. Open gradient magnetic separators, i.e. separators in which the gap is unobstructed, characterised by the configuration of the gap

**B03C 1/0355**

- ... using superconductive coils

**B03C 1/04**

- .. with the material carriers in the form of trays or with tables

**B03C 1/06**

- ... with magnets moving during operation

**B03C 1/08**

- ... with non-movable magnets

**B03C 1/10**

- .. with cylindrical material carriers ([B03C 1/247](#) takes precedence)

**B03C 1/12**

- ... with magnets moving during operation; with movable pole pieces

- B03C 1/14 . . . with non-movable magnets
- B03C 1/145 . . . . {with rotating annular or disc-shaped material carriers}
- B03C 1/16 . . with material carriers in the form of belts
- B03C 1/18 . . . with magnets moving during operation
- B03C 1/20 . . . . in the form of belts, e.g. cross-belt type
- B03C 1/22 . . . with non-movable magnets
- B03C 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
- B03C 1/24 . . . with material carried by travelling fields
- B03C 1/247 . . . . obtained by a rotating magnetic drum
- B03C 1/253 . . . . obtained by a linear motor
- B03C 1/26 . . with free falling material ([B03C 1/035](#) takes precedence)
- B03C 1/28 . . Magnetic plugs and dipsticks
- B03C 1/282 . . . {with associated accumulation indicator, e.g. Hall sensor}
- B03C 1/284 . . . {with associated cleaning means, e.g. retractable non-magnetic sleeve}
- B03C 1/286 . . . {disposed at the inner circumference of a recipient, e.g. magnetic drain bolt}
- B03C 1/288 . . . {disposed at the outer circumference of a recipient}
- B03C 1/30 . . Combinations with other devices, not otherwise provided for
- B03C 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 [B03B 5/30](#))}
- B03C 3/00** **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 [F01N 3/01](#))}
- B03C 3/01 . . Pretreatment of the gases prior to electrostatic precipitation
- B03C 3/011 . . Prefiltering; Flow controlling
- B03C 3/013 . . Conditioning by chemical additives, e.g. with SO<sub>3</sub>
- B03C 3/014 . . Addition of water; Heat exchange, e.g. by condensation
- B03C 3/016 . . by acoustic or electromagnetic energy, e.g. ultra-violet light
- B03C 3/017 . . Combinations of electrostatic separation with other processes, not otherwise provided for
- B03C 3/0175 . . . {Amassing particles by electric fields, e.g. agglomeration}
- B03C 3/019 . . Post-treatment of gases
- B03C 3/02 . . Plant or installations having external electricity supply ([electrode constructions B03C 3/40](#))
- B03C 3/025 . . . {Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations}

- B03C 3/04 .. dry type
- B03C 3/06 ... characterised by presence of stationary tube electrodes
- B03C 3/08 ... characterised by presence of stationary flat electrodes arranged with their flat surfaces parallel to the gas stream
- B03C 3/09 ... characterised by presence of stationary flat electrodes arranged with their flat surfaces at right angles to the gas stream
- B03C 3/10 ... characterised by presence of electrodes moving during separating action
- B03C 3/12 ... characterised by separation of ionising and collecting stations
- B03C 3/14 ... characterised by the additional use of mechanical effects, e.g. gravity ([B03C 3/32 takes precedence](#))
- B03C 3/145 .... Inertia
- B03C 3/15 .... Centrifugal forces
- B03C 3/155 .... Filtration
- B03C 3/16 .. wet type
- B03C 3/28 . Plant or installations without electricity supply, e.g. using electrets
- B03C 3/30 .. in which electrostatic charge is generated by passage of the gases, i.e. tribo-electricity
- B03C 3/32 . Transportable units, e.g. for cleaning room air ([room air-conditioners having an electrostatic separating stage F24F](#))
- B03C 3/34 . Constructional details or accessories or operation thereof
- B03C 3/36 .. Controlling flow of gases or vapour
- B03C 3/361 ... {by static mechanical means, e.g. deflector}
- B03C 3/363 .... {located before the filter}
- B03C 3/365 .... {located after the filter}
- B03C 3/366 .... {located in the filter, e.g. special shape of the electrodes}
- B03C 3/368 ... {by other than static mechanical means, e.g. internal ventilator or recycler}
- B03C 3/38 .. Particle charging or ionising stations, e.g. using electric discharge, radioactive radiation, flames ([electrode constructions B03C 3/40](#); [ionising gases H05H](#))
- B03C 3/383 ... {using radiation}
- B03C 3/386 ... {using flames}
- B03C 3/40 .. Electrode constructions
- B03C 3/41 ... Ionising-electrodes
- B03C 3/43 .... radioactive
- B03C 3/45 ... Collecting-electrodes
- B03C 3/455 .... {specially adapted for heat exchange with the gas stream ([B03C 3/53 takes precedence](#))}
- B03C 3/47 .... flat, e.g. plates, discs, gratings
- B03C 3/49 .... tubular {([B03C 3/455 takes precedence](#))}
- B03C 3/51 .... Catch- space electrodes, e.g. slotted-box form
- B03C 3/53 .... Liquid, or liquid-film, electrodes

B03C 3/60	...	Use of special materials other than liquids
B03C 3/62	....	ceramics
B03C 3/64	....	synthetic resins
B03C 3/66	..	Applications of electricity supply techniques
B03C 3/68	...	Control systems therefor
B03C 3/70	...	insulating in electric separators ( <a href="#">B03C 3/53</a> takes precedence)
B03C 3/72	..	Emergency control systems
B03C 3/74	..	Cleaning the electrodes
B03C 3/743	...	{by using friction, e.g. by brushes or sliding elements}
B03C 3/746	....	{Electricity supply or control systems therefor}
B03C 3/76	...	by using a mechanical vibrator, e.g. rapping gear; {by using impact}
B03C 3/761	....	{Drive-transmitting devices therefor, e.g. insulated shafts}
B03C 3/763	....	{Electricity supply or control systems therefor}
B03C 3/765	....	{with electromagnetic rappers}
B03C 3/766	....	{with pneumatic rappers}
B03C 3/768	....	{with free falling masses, e.g. dropped metal balls}
B03C 3/78	...	by washing
B03C 3/80	...	by gas or solid particle blasting
B03C 3/82	..	Housings
B03C 3/84	...	Protective coatings
B03C 3/86	..	Electrode-carrying means ( <a href="#">B03C 3/40</a> takes precedence)
B03C 3/88	..	Cleaning-out collected particles
B03C 3/885	...	{by travelling or oscillating electric fields, e.g. electric field curtains (electrostatic non-mechanical conveyers in general <a href="#">B65G 54/02</a> )}

**B03C 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

B03C 5/005	.	{Dielectrophoresis, i.e. dielectric particles migrating towards the region of highest field strength ( <a href="#">B03C 5/02</a> takes precedence; electrophoresis <a href="#">B01D 57/02</a> )}
B03C 5/02	.	Separators
B03C 5/022	..	{Non-uniform field separators}

- B03C 5/024 . . . {using high-gradient differential dielectric separation, i.e. using a dielectric matrix polarised by an external field}
- B03C 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)}
- B03C 5/028 . . . {using travelling electric fields, i.e. travelling wave dielectrophoresis (TWD)}

### **B03C 7/00      Separating solids from solids by electrostatic effect**

- B03C 7/003 . {Pretreatment of the solids prior to electrostatic separation}
- B03C 7/006 . {Charging without electricity supply, e.g. by tribo-electricity, pyroelectricity}
- B03C 7/02 . Separators
- B03C 7/023 . . {Non-uniform field separators}
- B03C 7/026 . . . {using travelling or oscillating electric fields}
- B03C 7/04 . . with material carriers in the form of trays, troughs, or tables
- B03C 7/06 . . with cylindrical material carriers
- B03C 7/08 . . with material carriers in the form of belts
- B03C 7/10 . . with material falling in cascades
- B03C 7/12 . . with material falling free

### **B03C 9/00      Electrostatic separation not provided for in a single preceding main group**

### **B03C 11/00      Separation by high-voltage electrical fields, not provided for in other groups of this subclass**

### **B03C 2201/00      Details of magnetic or electrostatic separation**

- B03C 2201/02 . Electro-statically separating liquids from liquids
- B03C 2201/04 . Ionising electrode being a wire
- B03C 2201/06 . Ionising electrode being a needle
- B03C 2201/08 . Ionising electrode being a rod
- B03C 2201/10 . Ionising electrode has multiple serrated ends or parts
- B03C 2201/12 . Cleaning the device by burning the trapped particles
- B03C 2201/14 . the gas being moved electro-kinetically
- B03C 2201/16 . Magnetic separating gases from gases e.g. oxygen from air
- B03C 2201/18 . the particles being suspended in a liquid

- B03C 2201/20 . the particles to be separated being in solid form
- B03C 2201/22 . characterised by the magnetical field, special shape or generation
- B03C 2201/24 . for measuring or calculating parameters, efficiency, etc.
- B03C 2201/26 . for use in medical applications
- B03C 2201/28 . Parts being easily removable for cleaning purposes
- B03C 2201/30 . for use in or with vehicles
- B03C 2201/32 . Checking the quality of the result or the well-functioning of the device