

**CPC****COOPERATIVE PATENT CLASSIFICATION****B04C****APPARATUS USING FREE VORTEX FLOW, e.g. CYCLONES (**

{ centrifugal separation of water from steam [B01D 45/12](#); } jet mills [B02C 19/06](#); { wind sifters [B07B 7/00](#); } cyclonic type combustion apparatus [F23](#); { vortex burners for cyclone-type combustion apparatus [F23D 1/02](#); cyclonic type combustion apparatus for gas turbines [F23R 3/00](#) } )

**NOTE**

This subclass covers apparatus for separating, mixing or like treating in which centrifugal effects are generated by free vortex flow, otherwise than by rotary bowls, rotors or curved passages.

**B04C 1/00**

**Apparatus in which the main direction of flow follows a flat spiral; { so-called flat cyclones or vortex chambers }**

**B04C 3/00**

**Apparatus in which the axial direction of the vortex { ( flow following a screw-thread type line ) } remains unchanged { Also devices in which one of the two discharge ducts returns centrally through the vortex chamber, a reverse-flow vortex being prevented by bulkheads in the central discharge duct ( combined with other devices [B04C 9/00](#) ) }**

**B04C 2003/003**

- . Shapes or dimensions of vortex chambers

**B04C 2003/006**

- . Construction of elements by which the vortex flow is generated or degenerated

**B04C 3/02**

- . with heating or cooling, e.g. quenching, means

**B04C 3/04**

- . Multiple arrangement thereof { ( combined with types according to other groups, [B04C 7/00](#) ) }

**B04C 3/06**

- . Construction of inlets or outlets to the vortex chamber

**B04C 5/00**

**Apparatus in which the axial direction of the vortex is reversed { ( combined with other devices [B04C 9/00](#) ) }**

**B04C 5/02**

- . Construction of inlets by which the vortex flow is generated { e.g. tangential admission, the fluid flow being forced to follow a downward path by spirally wound bulkheads, or with slightly downwardly-directed tangential admission } ( fluid dynamics in general [F15D](#) )

**B04C 5/04**

- .. Tangential inlets

**B04C 5/06**

- .. Axial inlets

**B04C 5/08**

- . Vortex chamber constructions

**B04C 5/081**

- .. Shapes or dimensions

**B04C 5/085**

- .. with wear-resisting arrangements

**B04C 5/087**

- .. with flexible gas-tight walls

- B04C 5/10 . . with perforated walls
- B04C 5/103 . . Bodies or members, e.g. bulkheads, guides, in the vortex chamber ( [cores B04C 5/107](#) )
- B04C 5/107 . . Cores; Devices for inducing an air-core in hydrocyclones ( [forming part of the outlet pipe B04C 5/13](#) )
  
- B04C 5/12 . Construction of the overflow ducting, e.g. diffusing or spiral exits
- B04C 5/13 . . formed as a vortex finder and extending into the vortex chamber { ( [exits with bulkheads preventing reverse flow vortex B04C 3/00](#) ) }; Discharge from vortex finder otherwise than at the top of the cyclone; Devices for controlling the overflow
- B04C 2005/133 . . . Adjustable vortex finder
- B04C 2005/136 . . . Baffles in the vortex finder
  
- B04C 5/14 . Construction of the underflow ducting; Apex constructions; Discharge arrangements; { [discharge through sidewall provided with a few slits or perforations](#) ( [provided with a great number of slits or perforations B04C 5/10](#) ) }
- B04C 5/15 . . with swinging flaps or revolving sluices; Sluices; Check-valves
- B04C 5/16 . . with variable-size outlets from the underflow ducting
- B04C 5/18 . . with auxiliary fluid assisting discharge
- B04C 5/181 . . Bulkheads or central bodies in the discharge opening
- B04C 5/185 . . Dust collectors
- B04C 5/187 . . . forming an integral part of the vortex chamber
  
- B04C 5/20 . with heating or cooling, e.g. quenching, means
  
- B04C 5/22 . with cleaning means
- B04C 5/23 . . using liquids
  
- B04C 5/24 . Multiple arrangement thereof { ( [combination types according to other /00 groups, B04C 7/00](#) ) }
- B04C 5/26 . . for series flow
- B04C 5/28 . . for parallel flow
- B04C 5/30 . . Recirculation constructions in or with cyclones which accomplish a partial recirculation of the medium, e.g. by means of conduits
  
- B04C 7/00** **Apparatus not provided for in group [B04C 1/00](#), [B04C 3/00](#), or [B04C 5/00](#); Multiple arrangements not provided for in one of the groups [B04C 1/00](#), [B04C 3/00](#), or [B04C 5/00](#); Combinations of apparatus covered by two or more of the groups [B04C 1/00](#), [B04C 3/00](#), or [B04C 5/00](#)**
  
- B04C 9/00** **Combinations with other devices, e.g. fans, { [expansion chambers, diffusors, water locks](#) } ( [with filters B01D 50/00](#) )**
  
- B04C 2009/001 . with means for electrostatic separation
- B04C 2009/002 . with external filters
- B04C 2009/004 . with internal filters, in the cyclone chamber or in the vortex finder

[B04C 2009/005](#) . with external rotors, e.g. impeller, ventilator, fan, blower, pump

[B04C 2009/007](#) . with internal rotors, e.g. impeller, ventilator, fan, blower, pump

[B04C 2009/008](#) . with injection or suction of gas or liquid into the cyclone

**[B04C 11/00](#)** **Accessories, e.g. safety or control devices, not otherwise provided for** { e.g. regulators, valves in inlet or overflow ducting } ( with electrostatic precipitating arrangements [B03C 3/14](#) )