

**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	<ul style="list-style-type: none"> <li>Construction of the overflow ducting, e.g. diffusing or spiral exits</li> </ul>
B04C 5/13	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>formed as a vortex finder and extending into the vortex chamber <a href="#">{(exits with bulkheads preventing reverse flow vortex B04C 3/00)}</a>; Discharge from vortex finder otherwise than at the top of the cyclone; Devices for controlling the overflow</li> </ul> </li> </ul>
B04C 2005/133	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li><a href="#">{Adjustable vortex finder}</a></li> </ul> </li> </ul>
B04C 2005/136	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li><a href="#">{Baffles in the vortex finder}</a></li> </ul> </li> </ul>
B04C 5/14	<ul style="list-style-type: none"> <li>Construction of the underflow ducting; Apex constructions; Discharge arrangements; <a href="#">{discharge through sidewall provided with a few slits or perforations (provided with a great number of slits or perforations B04C 5/10)}</a></li> </ul>
B04C 5/15	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with swinging flaps or revolving sluices; Sluices; Check-valves</li> </ul> </li> </ul>
B04C 5/16	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with variable-size outlets from the underflow ducting</li> </ul> </li> </ul>
B04C 5/18	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with auxiliary fluid assisting discharge</li> </ul> </li> </ul>
B04C 5/181	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Bulkheads or central bodies in the discharge opening</li> </ul> </li> </ul>
B04C 5/185	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Dust collectors</li> </ul> </li> </ul>
B04C 5/187	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>forming an integral part of the vortex chamber</li> </ul> </li> </ul>
B04C 5/20	<ul style="list-style-type: none"> <li>with heating or cooling, e.g. quenching, means</li> </ul>
B04C 5/22	<ul style="list-style-type: none"> <li>with cleaning means</li> </ul>
B04C 5/23	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using liquids</li> </ul> </li> </ul>
B04C 5/24	<ul style="list-style-type: none"> <li>Multiple arrangement thereof <a href="#">{(combination types according to other /00 groups, B04C 7/00)}</a></li> </ul>
B04C 5/26	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for series flow</li> </ul> </li> </ul>
B04C 5/28	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>for parallel flow</li> </ul> </li> </ul>
B04C 5/30	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Recirculation constructions in or with cyclones which accomplish a partial recirculation of the medium, e.g. by means of conduits</li> </ul> </li> </ul>
<b>B04C 7/00</b>	<p><b>Apparatus not provided for in group <a href="#">B04C 1/00</a>, <a href="#">B04C 3/00</a>, or <a href="#">B04C 5/00</a>; Multiple arrangements not provided for in one of the groups <a href="#">B04C 1/00</a>, <a href="#">B04C 3/00</a>, or <a href="#">B04C 5/00</a>; Combinations of apparatus covered by two or more of the groups <a href="#">B04C 1/00</a>, <a href="#">B04C 3/00</a>, or <a href="#">B04C 5/00</a></b></p>
<b>B04C 9/00</b>	<p><b>Combinations with other devices, e.g. fans, <a href="#">{expansion chambers, diffusors, water locks}</a> (with filters <a href="#">B01D 50/00</a>)</b></p>
B04C 2009/001	<ul style="list-style-type: none"> <li><a href="#">{with means for electrostatic separation}</a></li> </ul>
B04C 2009/002	<ul style="list-style-type: none"> <li><a href="#">{with external filters}</a></li> </ul>
B04C 2009/004	<ul style="list-style-type: none"> <li><a href="#">{with internal filters, in the cyclone chamber or in the vortex finder}</a></li> </ul>
B04C 2009/005	<ul style="list-style-type: none"> <li><a href="#">{with external rotors, e.g. impeller, ventilator, fan, blower, pump}</a></li> </ul>
B04C 2009/007	<ul style="list-style-type: none"> <li><a href="#">{with internal rotors, e.g. impeller, ventilator, fan, blower, pump}</a></li> </ul>
B04C 2009/008	<ul style="list-style-type: none"> <li><a href="#">{with injection or suction of gas or liquid into the cyclone}</a></li> </ul>
<b>B04C 11/00</b>	<p><b>Accessories, e.g. safety or control devices, not otherwise provided for <a href="#">{e.g. regulators, valves in inlet or overflow ducting}</a> (with electrostatic precipitating arrangements <a href="#">B03C 3/14</a>)</b></p>