

**CPC****COOPERATIVE PATENT CLASSIFICATION****F15D**

**FLUID DYNAMICS, i.e. METHODS OR MEANS FOR INFLUENCING THE FLOW OF GASES OR LIQUIDS** ({nozzles, spray heads [B05B](#); devices to decrease friction or resistance or to increase speed of ships [B63B](#); ship rudders [B63H 25/38](#); influencing the flow or the viscosity of fluids with chemical additives [C09K 3/00](#), [C10M](#); hydraulic engineering [E02B](#); fluid circuit elements [F15C](#); { one-way check valves [F16K 15/00](#)})

**NOTE**

This subclass comprises boundary-layer control and other arrangements and methods, not provided for in other classes, for influencing the flow of fluids relative to constraining surfaces and after leaving these surfaces, e.g. producing or removing turbulence, deflecting jets, guiding flow through bends in conduits, affecting distribution of fluid in a conduit, reducing fluid friction.

**F15D 1/00****Influencing flow of fluids**

F15D 1/0005

. {Baffle plates}

F15D 1/001

. {Flow of fluid from conduits such as pipes, sleeves, tubes, with equal distribution of fluid flow over the evacuation surface}

F15D 1/0015

. {Whirl chambers}

F15D 1/002

. {by influencing the boundary layer ([F15D 1/06](#) and [F15D 1/12](#) take precedence)}**WARNING**

[F15D 1/002](#) and subgroups are not complete pending a reorganisation, see also [F15D 1/06](#), [F15D 1/065](#) and [F15D 1/12](#)

F15D 1/0025

.. {using passive means, i.e. without external energy supply}

F15D 1/003

... {comprising surface features, e.g. indentations or protrusions ([F15D 1/0055](#), [F15D 1/006](#) take precedence)}

F15D 1/0035

.... {in the form of riblets}

F15D 1/004

..... {oriented essentially parallel to the direction of flow}

F15D 1/0045

..... {oriented essentially perpendicular to the direction of flow}

F15D 1/005

.... {in the form of dimples}

F15D 1/0055

... {comprising apertures in the surface, through which fluid is withdrawn from or injected into the flow}

F15D 1/006

... {comprising moving surfaces, wherein the surface, or at least a portion thereof is moved or deformed by the fluid flow}

F15D 1/0065

.. {using active means, e.g. supplying external energy or injecting fluid}

F15D 1/007

... {comprising surfaces being moved by external supplied energy}

F15D 1/0075

... {comprising electromagnetic or electrostatic means for influencing the state of the fluid, e.g. for ionising the fluid or for generating a plasma}

F15D 1/008

... {comprising fluid injection or suction means}

F15D 1/0085

.. {Methods of making characteristic surfaces for influencing the boundary layer}

- F15D 1/009 . {by means of vortex rings}
- WARNING**
- Not complete pending a reorganisation, see also [F15D 1/00](#)
- F15D 1/0095 . {by means of injecting jet pulses of fluid wherein the injected fluid is taken from the fluid and re-injected again, e.g. synthetic jet actuators ([F15D 1/008](#) takes precedence)}
- WARNING**
- Not complete pending a reorganisation, see also [F15D 1/00](#)
- F15D 1/02 . in pipes or conduits
- F15D 1/025 . . {by means of orifice or throttle elements}
- WARNING**
- Not complete pending a reorganisation, see also [F15D 1/02](#)
- F15D 1/04 . . Arrangements of guide vanes in pipe elbows or duct bends; Construction of pipe conduit elements or elbows with respect to flow, specially for reducing losses in flow
- F15D 1/06 . . by influencing the boundary layer {(use of materials, e.g. to reduce surface friction [C09K 3/00](#))}
- F15D 1/065 . . . {Whereby an element is dispersed in a pipe over the whole length or whereby several elements are regularly distributed in a pipe}
- F15D 1/08 . of jets leaving an orifice (nozzles or outlets with means for mechanically breaking up or deflecting the jet [B05B](#), e.g. [B05B 1/26](#))
- F15D 1/10 . around bodies of solid material
- F15D 1/12 . . by influencing the boundary layer {(use of materials, e.g. to reduce surface friction [C09K 3/00](#))}
- F15D 1/14 . Diverting flow into alternative channels (in hydraulic engineering [E02B](#))