

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### ENGINEERING IN GENERAL

## F15 FLUID-PRESSURE ACTUATORS; HYDRAULICS OR PNEUMATICS IN GENERAL

## 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.

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

|             |  |        |   |
|-------------|--|--------|---|
| <b>1/00</b> | <b>Influencing flow of fluids</b>  |        |   |
| 1/0005      | . {Baffle plates}  | 1/0085 | . . {Methods of making characteristic surfaces for influencing the boundary layer}  |
| 1/001       | . {Flow of fluid from conduits such as pipes, sleeves, tubes, with equal distribution of fluid flow over the evacuation surface}                         | 1/009  | . {by means of vortex rings}  |
| 1/0015      | . {Whirl chambers}   | 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 ( <a href="#">F15D 1/008</a> takes precedence)} |
| 1/002       | . {by influencing the boundary layer ( <a href="#">F15D 1/06</a> and <a href="#">F15D 1/12</a> take precedence)}   | 1/02   | . in pipes or conduits  |
| 1/0025      | . . {using passive means, i.e. without external energy supply}   | 1/025  | . . {by means of orifice or throttle elements}  |
| 1/003       | . . . {comprising surface features, e.g. indentations or protrusions ( <a href="#">F15D 1/0055</a> , <a href="#">F15D 1/006</a> take precedence)}        | 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                           |
| 1/0035      | . . . . {in the form of riblets}   | 1/06   | . . by influencing the boundary layer {(use of materials, e.g. to reduce surface friction <a href="#">C09K 3/00</a> )}  |
| 1/004       | . . . . . {oriented essentially parallel to the direction of flow}   | 1/065  | . . . {Whereby an element is dispersed in a pipe over the whole length or whereby several elements are regularly distributed in a pipe}   |
| 1/0045      | . . . . . {oriented essentially perpendicular to the direction of flow}  | 1/08   | . of jets leaving an orifice (nozzles or outlets with means for mechanically breaking up or deflecting the jet <a href="#">B05B</a> , e.g. <a href="#">B05B 1/26</a> )                              |
| 1/005       | . . . . {in the form of dimples}   | 1/10   | . around bodies of solid material   |
| 1/0055      | . . . {comprising apertures in the surface, through which fluid is withdrawn from or injected into the flow}   | 1/12   | . . by influencing the boundary layer {(use of materials, e.g. to reduce surface friction <a href="#">C09K 3/00</a> )}  |
| 1/006       | . . . {comprising moving surfaces, wherein the surface, or at least a portion thereof is moved or deformed by the fluid flow}                            | 1/14   | . Diverting flow into alternative channels (in hydraulic engineering <a href="#">E02B</a> )   |
| 1/0065      | . . {using active means, e.g. supplying external energy or injecting fluid}  |        |   |
| 1/007       | . . . {comprising surfaces being moved by external supplied energy}  |        |   |
| 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} |        |   |
| 1/008       | . . . {comprising fluid injection or suction means}  |        |   |