

# 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.

- |             |                                                                                                                                                                                   |        |                                                                                                                                                                                                     |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1/00</b> | <b>Influencing flow of fluids</b>                                                                                                                                                 | 1/008  | . . . {comprising fluid injection or suction means}                                                                                                                                                 |
| 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}                                                                                                                                                                |        | <b><u>WARNING</u></b>                                                                                                                                                                               |
| 1/002       | . {by influencing the boundary layer ( <a href="#">F15D 1/06</a> and <a href="#">F15D 1/12</a> take precedence)}                                                                  |        | Not complete pending a reorganisation, see also <a href="#">F15D 1/00</a>                                                                                                                           |
|             | <b><u>WARNING</u></b>                                                                                                                                                             | 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)} |
|             | <a href="#">F15D 1/002</a> and subgroups are not complete pending a reorganisation, see also <a href="#">F15D 1/06</a> , <a href="#">F15D 1/065</a> and <a href="#">F15D 1/12</a> |        | <b><u>WARNING</u></b>                                                                                                                                                                               |
| 1/0025      | . . {using passive means, i.e. without external energy supply}                                                                                                                    |        | Not complete pending a reorganisation, see also <a href="#">F15D 1/00</a>                                                                                                                           |
| 1/003       | . . . {comprising surface features, e.g. indentations or protrusions ( <a href="#">F15D 1/0055</a> , <a href="#">F15D 1/006</a> take precedence)}                                 | 1/02   | . in pipes or conduits                                                                                                                                                                              |
| 1/0035      | . . . . {in the form of riblets}                                                                                                                                                  | 1/025  | . . {by means of orifice or throttle elements}                                                                                                                                                      |
| 1/004       | . . . . . {oriented essentially parallel to the direction of flow}                                                                                                                |        | <b><u>WARNING</u></b>                                                                                                                                                                               |
| 1/0045      | . . . . . {oriented essentially perpendicular to the direction of flow}                                                                                                           |        | Not complete pending a reorganisation, see also <a href="#">F15D 1/02</a>                                                                                                                           |
| 1/005       | . . . . {in the form of dimples}                                                                                                                                                  | 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                           |
| 1/0055      | . . . {comprising apertures in the surface, through which fluid is withdrawn from or injected into the flow}                                                                      | 1/06   | . . by influencing the boundary layer ( <a href="#">use of materials, e.g. to reduce surface friction 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}                                                     | 1/065  | . . . {Whereby an element is dispersed in a pipe over the whole length or whereby several elements are regularly distributed in a pipe}                                                             |
| 1/0065      | . . {using active means, e.g. supplying external energy or injecting fluid}                                                                                                       | 1/08   | . of jets leaving an orifice ( <a href="#">nozzles or outlets with means for mechanically breaking up or deflecting the jet B05B</a> , e.g. <a href="#">B05B 1/26</a> )                             |
| 1/007       | . . . {comprising surfaces being moved by external supplied energy}                                                                                                               | 1/10   | . around bodies of solid material                                                                                                                                                                   |
| 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

- 1/12 . . by influencing the boundary layer {(use of materials, e.g. to reduce surface friction [C09K 3/00](#)}
- 1/14 . Diverting flow into alternative channels (in hydraulic engineering [E02B](#))