THE ELEMENTS OF HYDROSTATICS AND HYDRODYNAMICS

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The Elements of Hydrostatics and Hydrodynamics by W. H. Miller

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W. H. MILLER

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ELEMENTS OF HYDROSTATICS.

SECTION I.

GENERAL PROPERTIES OF FLUIDS.

ART. 1. A FLUID is a body which can be divided in any direction, and whose parts can be moved among one another by any assignable force.

Elastic fluids are those whose dimensions are increased or diminished when the pressure upon them is diminished or increased. Non-elastic fluids are those whose dimensions are independent of the pressure.

Water, mercury, and probably all other liquids, are in a small degree compressible. Their resistance however to compression is so great, that the conclusions obtained on the supposition of their being incompressible, are in most cases free from any sensible error.

2. Let *DEF* (fig. 1.) be a piston without weight exactly fitting an orifice in the plane *ABC*, which forms the side of a vessel containing fluid. It is manifest that the fluid can make no effort to move the piston in any other direction than that of a normal to its surface, the piston may therefore be kept at rest by a force applied at some point *G* in it, and acting in a direction *HG* perpendicular to *DEF*. A force equal and opposite to this is called the pressure of the fluid on *DEF*.

3. The pressure of a fluid at a given point is measured by the quantity p, $p\kappa$ being the pressure of the fluid on an indefinitely small area κ contiguous to the given point.

When the pressure of a fluid on a given surface is the same, wherever that surface is placed, p is the pressure on an unit of surface. When the pressure on a given surface, varies with the situation of the surface, p is the pressure which would be exerted on an unit of surface, if the pressure at each part of the unit of surface were equal to the pressure at the given point.