HYDRAULICS.MECHANICS.IM

A small push, a bigger one

Example area ratios — illustrations, not measurements of a historic machine.

If two pistons share one closed vessel of liquid, the IMechE says, pressure throughout that closed system is constant. A force on the smaller piston is translated into a larger force on the larger piston. The difference "would be proportional to the difference in area of the two pistons." The cylinders "act in a similar way to that in which a lever is used to increase the force exerted."

Example (illustration only)	What the area rule means
2×	If the larger piston has twice the area of the smaller one, the same pressure gives twice the force.
5×	Five times the area, five times the force. Five is a number chosen for teaching, not a historic rating.
10×	Ten times the area, ten times the force — still an illustration, not a measurement of Bramah's press.
20×	Twenty times the area, twenty times the force. The examples on the website desk stop here.

From the town mains to an accumulator

The 1911 Britannica says Armstrong's first hydraulic crane, erected on the Newcastle quay in 1846, took its pressure from the ordinary water mains of the town. In 1850, at a new ferry station at New Holland on the Humber, there were no mains, and a special reservoir would have cost too much "owing to the character of the soil." So he invented the accumulator, "the crown of the hydraulic system."

A short quiz

1. Are the 2×, 5×, 10× and 20× figures on this sheet measurements of Bramah's press?
2. Where, and in which year, does the 1911 Britannica place Armstrong's first hydraulic crane?
3. What name does that article give the 1850 device invented at New Holland?

Answers. 1. No. They are illustrations of the area rule. 2. On the quay at Newcastle, in 1846. 3. The accumulator.

Wording from Karyn French, Institution of Mechanical Engineers, 28 December 2017, and from the 1911 Encyclopaedia Britannica article "Armstrong, William George Armstrong, Baron." Checked 17 November 2026.