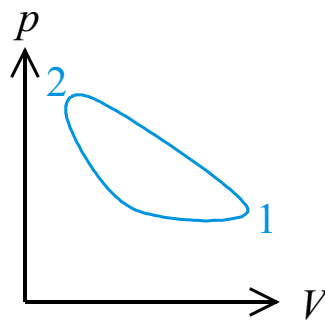


### 1.3 First Axiom of Thermodynamics

$$\begin{array}{rcl} dU & = & \delta Q - dW \\ \text{Change of the inner energy} & = & \text{heat energy (into system)} - \text{work (performed by system)} \end{array} \quad (1.2)$$

$\delta Q$ : heat energy  
 not!! heat stuff: A scientific letter of the 19. century:  
 Blacksmith uses a hammer to form metal; the metal gets warm;  
 the heat stuff flows from the hand into the metal;  
 as a consequence the hand and the head of the blacksmith become cold!

- energy is conserved
- not force (as was successfully introduced by Newton's mechanics  $F = ma$ ) but energy is the new fundamental concept of physics
- which force belongs to the heat energy? (later)



Example:

$$U_2 - U_1 = Q - W \quad (1.3)$$

p.s.  $pV$ -diagrams have been a company secret of James Watt for several years.  
 Thus he had a monopoly for good heat transforming machines.