Valve Encyclopedia Article

Valve

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Valve

A valve is a device used to control the flow of a substance, usually a fluid, in an enclosed area. Valves date from antiquity and are used today in such varied mechanical systems as faucets, automobile engines, dishwashers, and aqualungs.

Early metalworkers used a check valve in bellows of their forges. Check valves are made with a hinged flap or a ball held on a seat by gravity and allow the air to pass in only one direction. When the Greek physicist Ctesibus (second century B.C.) invented a hydraulic water organ that used slide valves to control air intake to the organ pipes, valves found applications in machinery. During the Renaissance, Leonardo da Vinci designed a conical poppete valve, or safety valve. This valve is held in place by a spring or weight and opens when the fluid behind it reaches a certain pressure. His contemporary, Aleotti, used a butterfly valve: two hinged plates were fashioned so that they flipped up or down in a pipe. Three hundred years later Carl Benz used the butterfly valve with great success to regulate the fuel-air mixture in his automobile carburetor.

As scientists developed new materials, such as steel alloys, and refined metalworking processes, valves could be used in a greater variety of machines, such as internal combustion engines. James Watt's nineteenth-century steam engine employed valves to admit low-pressure steam, which forced the piston down. Other valves released the air that accumulated in the cylinder. Watt's innovation is now called a slide valve: the moving parts of the valve slide back and forth across the openings made in the cylinder, thus opening and closing them as needed.

For turning on or shutting off the flow of liquids, globe, gate, and needle valves are used. Operated by an outside force, these valves have a plug, disk, or needle on the inside that is screwed down across the flow of water, thus cutting off the flow. To allow the liquid to flow, the wheel on top is twisted in the opposite direction, which raises the stem that had been blocking the tube where the liquid was contained.