PUMPS

Pumps—big pumps and little pumps, simple hand pumps and complex high speed motor pumps—play an important part in modern mining. As the miner goes underground, the disposal of water becomes more and more of a problem. Occasionally a mine is so situated that natural drainage can be effected, but it is seldom indeed that a large mine does not depend to a great extent upon an efficient pumping system.

The pump—a machine to raise or move fluids—is so old that it is very difficult to say exactly when the first one was used. Primitive pumps consisted simply of a series of earthenware pots attached to a rope, by which water could be hoisted to the surface from wells. The Egyptians used such a chain of pots to secure water from the Nile for irrigation purposes.

In England, in the 16th century, the Saxons used hand pumps, the cylinders of which consisted of hollow tree trunks. When the use of iron for industrial purposes was started, in the 18th century, one of the first applications of the new material was for the manufacture of pumps.

The past century has brought about a tremendous improvement in pumps and pumping machinery, so much so that today much of our civilization depends on pumps. Steamships, automobiles, train, airplanes—every form of mechanical conveyance depends on a pump to supply it with liquid fuel, lubricant, and cooling medium. Large cities could not exist without intricate pumping systems to provide water and to dispose of sewage. The electric power which makes our mechanical age possible is based on pumps, in hydro-electric plants, in Diesel engines.

The pump has many uses in the mining industry. In the mine it disposes of excess underground water, and carries water to the drills. Air pumps motivate drills and ventilate remote workings. In the milling plant the ground-up ore, mixed with water and chemicals, is moved from place to place by pumps. In the smelter, elaborate pumping systems force cooling water and lubricants to various important points.

There are several types and thousands of varieties of pumps. The centrifugal pump is most used in the mining industry. This pump consists of an impeller fitted with vanes and rotating in a closed casing. Water is supplied to the center of the impeller, and due to its rotation in the impeller its pressure is increased by centrifugal force and it is delivered at the edge of the casing with increased pressure and high velocity.

The reciprocating pump (technical name for the old-fashioned hand pump which stood at the back door) may be either single or double-acting—that is, water may be discharged either on alternate strokes or on every stroke.

The air lift pump uses air pressure to raise water or other fluid. The hydraulic ram was devised to use the energy of a water supply at a low head to pump part of this water to a height greater than that of the source of supply.

Modern pumps vary in size from one which you could put in your pocket, and costing but a few dollars, to an enormous pump forcing a stream of water 12 feet in diameter over mountains for the water supply of metropolitan districts, costing many thousands.

High-speed pumps can force a sizeable stream of water as high as 4,000 feet, while the larger pumps can handle many thousands of gallons of water per minute.