

Pascal's Principle and 1966

In the chapter "Pascal's Principle and 1966," Dr. Harrington discusses his real-world introduction to Pascal's Principle and the many applications of the principle that he discovered throughout his life. Dr. Eldred graces us with facts and humor; an array of impressive knowledge that displays the transcendent nature of Pascal's Principle across many fields. Equally entertaining and informative, this story is a consummate example of Dr. Harrington's academic prowess and intellectual range.

In the summer of 1912, a young Kansas farm-boy discovered Pascal's Hydraulic Principle while transporting much needed water-jugs to a few hay-hands. It was an applied force to a makeshift plug at the mouth of the jug which uniformly distributed a blast and resulted in a bottomless jug. This blast fueled a scientific curiosity in the ten-year old future academic and serves as the fundamental principle behind the drastic industrial advancements made in the 20th century – namely, application of the hydraulic press in mass-production factories.

The hydraulic principle saw rapid application in mid to late 20th century technology. As cited by Dr. Harrington, the hydraulic principle is defined as "pressure applied to a confined liquid is transmitted equally, and with undiminished force, in all directions" (Harrington, 1968, p. 185). This principle is seen through the implementation of power steering in road vehicles (arguably the most important of the applications if you ask anyone born c. 1950), advancements in heavy machinery (front-loader, backhoe, etc.), and, of most significance, through implementation of the hydraulic press in manufacturing. Contrary to the common lever, the hydraulic press can magnify force without requiring large lever arms which offers a much more compact and beneficial alternative for mass-production industrial applications.

Also, as Dr. Harrington drew from an efficiency analogy, the hydraulic press operates at an impressive 90% efficiency. For perspective, the human body operates at about 5% efficiency, a steam power plant operates at about 10%, and a gas engine operates at a generous estimate of 25%. This level of sustainable efficiency coupled with a favorable size relative to the alternatives, made the hydraulic press, through Pascal's Principle, revolutionary.

Whether you are pursuing a PhD or you are a 10-year-old kid working around a farm, science is all around us. Dr. Harrington discovered this fact at an early age and strived to understand the underlying science of everyday life. This curiosity and determination led to graduate degrees in multiple fields, and eventually to a book of wisdom in "An Engineer Writes about People and Places and Projects." I am honored to have received the Dr. Eldred Harrington Scholarship for the Spring of 2018, and look forward to carefully reading about Dr. Harrington's work and reminiscences.