

PUZZLING TOGETHER A Gear Pioneer

Gear Technology's bimonthly aberration—gear trivia, humor, weirdness and oddments for the edification and amusement of our readers. Contributions are welcome.

The *Dictionary of American Biography* describes him as “one of the founders of the gear-cutting industry in the United States.” He built the first hobbing machine for cutting spur gears. He founded the companies that are now Boston Gear and Philadelphia Gear Corp.

“He certainly was a dominant force in the gear industry in the early 1900s,” says Jim Devine. A retired Philadelphia Gear sales manager, Devine wrote a history for his company’s centennial in 1992.

That founder and dominant force is George Barnard Grant, and puzzling together his history was a little difficult.

The Addendum team happened to learn about Grant while looking into the history of the involute curve. We searched the Internet, but found the World Wide Web wanting for information about Grant.

We were able, though, to gather some information on this gear pioneer, thanks to Devine, gear consultant Richard L. Thoen and Steven Lubar of the Smithsonian Institution.

According to Devine, Grant’s hobbing machine substantially improved gear technology.

“The hobbing machine allowed them to cut gears from steel,” he says. “That was the real advancement.”

Steel gears could withstand more vibration than cast-iron gears and could transmit more horsepower.

“Cast gears could be quite brittle,” Devine says. “Cast gears could break and become inoperable.” He adds that Grant’s machine affected the railroad, steel mill and textile machinery industries—“and, of course, the automotive industry.”

Grant applied for a patent on his machine in 1887, receiving the patent in 1889. But, the idea for hobbing gear teeth doesn’t appear to have been his.

According to a history by Barber-Colman Co., Christian Schiele first thought of generating gear teeth via a hobbing process in 1856, developing the idea that a rack cutter in cylindrical form might be synchronized with a rotating gear blank to generate a gear tooth form. But, according to the Barber-Colman history, Schiele’s process was so far ahead of contemporary mechanical technology that no one could build a machine to carry out that process.

In 1856, Grant was just a boy. Born Dec. 21, 1849, Grant prepared for college at the Bridgton Academy in Maine. He later studied at Dartmouth College’s Chandler Scientific School and at Harvard College’s Lawrence Scientific School. He graduated from Harvard with the class of 1873, receiving a bachelor-of-science degree.

After his graduation, Grant started a machine shop for gear cutting in Charlestown, MA.

By 1885, he supported the involute form instead of the epicycloidal form for gear teeth, according to the booklet “A Note on Early Gears and Gear Cutting Machines,” written by N.J.C. Peres.

According to Peres, Grant’s support came at the height of the involute-epicycloidal debate. Peres writes that the involute form superseded the cycloidal form because the involute form could be easily generated by a straight-sided rack cutter or a gashed hob’s approximate straight-sided racking section and because the involute gear would transmit uniform rotation at

**“HE CERTAINLY WAS
A DOMINANT FORCE IN
THE GEAR INDUSTRY IN
THE EARLY 1900s.”**

different center distances.

An inventor and mechanical engineer, Grant held a number of patents from his work in gear cutting and its machinery.

Despite those accomplishments, Grant’s gear work isn’t detailed in the *Dictionary of American Biography* as much as his work on creating a calculating machine for doing addition, subtraction, multiplication and division.

The dictionary entry on Grant says he made his money in gear cutting and gear-cutting machinery, but its longest paragraph on him is about his work on a time- and labor-saving calculating machine.

The entry adds that Grant never stopped studying calculating machines and conducted considerable experimental work on their development during the last years of his life. Grant died Aug. 16, 1917, in Pasadena, CA.

But, the entry notes that Grant still owned Grant Gear Works Inc. of Boston, MA, when he died, and that it continued after his death. ☉

Tell Us What You Think . . .

If you found this article of interest and/or useful, please **circle 340**.

If you did not care for this article, **circle 341**.