

# The Bridges of Cook County and Other Sagas

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

**I**n spite of being the "Second City," Chicago has always cultivated a reputation for bigness. We're known for big talk, big shoulders, big basketball players—and big gears. While not necessarily the biggest in the world (more about that later), some Chicago gears are among the hardest working.

Take, for example, our bridge gears.

Among the city's other claims to fame is that it is the home of the double-leaf trunnion counter-balanced bascule bridge—the lift bridge for short. The span of such bridges splits in the middle, each side lifting toward the shore to leave the river passage open.

Crucial to the working of the bridge is the rack and pinion system that raises and lowers the leaves (the equivalent of a block or more of city street) several hundred times a year in all weathers.

Each of the 32 bridges across the Chicago River is one-of-a-kind, but the one at E. 106th St. is fairly typical. Built in 1927, each of its leaves is lifted by a curved rack with 46 teeth and an 18' pitch circle radius. It moves through an arc of 78° 49'. It is driven by a 14-tooth pinion or bull gear with a pitch diameter of 31", a root diameter of 28" and an outside diameter of 36". Its pitch radius is 15.5". Both the rack and pinion are made of cast steel.

The reduction gears in the motor that drives the system aren't wimpy either. The pinion has 15 teeth and an outside diameter of 17". The three gears have 59, 71 and 125 teeth with outside diameters of 86", 73" and 50.8" respectively. According to the blueprints, the teeth all "conform to the Brown & Sharpe, stan-

dard, 14.5° involute, except that the pitch line thickness of the tooth shall be 0.49 times the circular pitch to provide backlash." (Our thanks to Stan Kaderbek of the City of Chicago Dept. of Transportation for sharing his insights and his blueprints.)

## Mr. Ferris's Wheel

Some Chicago gears work hard at providing good times. The Ferris wheel, named after its builder, G.W.G. Ferris, was introduced here at the 1893 World Columbian Exposition. The original wheel was driven by a series of gear plates fitted around the rim. The teeth on the plates fitted into a pair of endless chains at the base of the wheel, rather on the same principle as the bicycle.

The original Ferris wheel is long gone, but it has been reincarnated down at Navy Pier. This big wheel is 150' high and 139' in diameter. It is driven by a

DC drive consisting of eight synchronized motors.

Michael Emerson of VOA Associates, the pier's architects, points out that the Ferris wheel can be viewed as a giant toothless gear set. The eight motors drive eight balloon wheels (think giant rubber tires), which meet the outer diameter of the wheel and drive it by friction.

## And Big Gears From Down Under

The World's Biggest Gear Saga, cont'd. Addendum has received a fax from Mr. Peter Mayo of Toronto, N.S.W., Australia. He tells us that the company Envirotech has designed and installed a 92 meter (302') diameter "red-mud" thickeners in Western Australia. Around the perimeter of the tank is a series of toothed racks which form a circle of 93 meters (305'). The rack forms the final drive for the thickener stirring device.

Mr. Mayo also raises an interesting philosophical question. Since neither this thickener rack nor the Bucyrus-Erie dragline rack mentioned in our last issue move, are they "real" gears? Or should that name be reserved for gears that rotate? If so, what do we call these big rack drivers? And what are "real" gears anyway? Real as opposed to what? Unreal? Fake?

Anyone ready to take on the metaphysics of gears? Addendum is up for it if you are. ☉



"Well, as it turns out, the turkey in the company raffle is none other than old Edsy down in accounting."

**The Addendometer:** If you've read this far on the page and enjoyed it, please circle 225.