

## Historic Yates Mill County Park Text From Mill Operation Videos

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### I. Corn Meal Production

#### *How Power is Transferred from the Waterwheel to the Corn Milling Machinery:*

Whether grinding corn or wheat, the miller relies on the same basic power source. Flowing water stored in the millpond supplies all the energy needed to run Yates Mill's machinery. To release that energy, the miller opens the control gate of the flume and allows water to flow onto the top of the waterwheel, where the weight of the water turns the wheel. The ring gear attached to the wheel is meshed with a pinion gear on the end of the mill's main horizontal drive shaft. Through several power-transfer systems, this long axle will supply energy to operate all machinery in the mill above. To grind corn, a bevel gear at the far end of the main drive shaft transfers its turning force to a nut gear that is connected to the vertical spindle of the corn-grinding millstones. Back at the drive shaft, a belt-and-pulley system is also transferring power to another horizontal axle located on the second floor. From this axle, more belts and pulleys, and a third horizontal axle, supply the energy that runs the corn sheller, grain elevator, and other operations upstairs.

#### *How Corn Becomes Meal at Yates Mill:*

The corn milling process starts at the ground floor of the sawmill shed where dried ears of corn are shelled. (Originally, this was done on a hand-cranked sheller; this direct-feed Lightning Double-Throated Sheller was added to the mill at a later time.) Farmers might instead have shelled their corn at home before heading to the mill. Freed from the cobs, kernels of corn drop through a chute and into the bottom of a grain elevator, where small buckets scoop them up and carry them to the third floor. The cobs are exhausted through a chute and pile up under the mill, until they are cleaned up and used for other purposes. The grain then moves through a chute to the second floor where a simple corn cleaner runs kernels over several wire screens – dirt and trash are filtered through holes in the wire screen, while the cleaned corn tumbles down and is collected in a garner, and then is conveyed through a chute into a grain hopper positioned above the quartzite millstones. The “shoe” feeds kernels into the eye of the stone, as the movement of the “damsel” helps regulate the flow of grain. As it's ground, the corn meal is forced from between the stones into the surrounding wooden hoop, or “casing,” and from there into the meal bin to be bagged. Corn meal was not sifted at Yates Mill; it was sold “unbolted.”

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### II. Wheat Flour Production

#### *How Power is Transferred from the Waterwheel to the Wheat Milling Machinery:*

For wheat flour or corn meal, the origin of the grinding power is the same. When the miller raises the head gate to allow water into the flume, he is harnessing the power of water that has been stored in the millpond. As the control gate is raised and water flows into the waterwheel's buckets, it begins to turn, along with the attached ring gear. This gear is meshed with a pinion gear on the end of the mill's main horizontal drive shaft. Through several different power-transfer systems, this long axle supplies the energy needed to operate all machinery in the mill above. To grind wheat, the turning force of the mill's main horizontal drive shaft is transferred to a chain drive that rotates a secondary horizontal axle, a gear cluster, and the vertical spindle that takes power to the wheat-grinding stones. The main drive shaft's chain drive also directs power to an intermediate drive shaft that powers a wooden crown gear. A small crown gear on a wooden vertical shaft transfers power up through all of the floors of the mill where gears, pulleys, and belts then transfer power to various machines.

#### *How Wheat Becomes Flour at Yates Mill:*

Using Oliver Evans' 18<sup>th</sup>-century technology, the process of turning wheat into fine flour is fully automated. The grain is weighed, then put into a bin connected to a grain elevator that carries it up to a rolling-screen cleaner on the third floor, where harvest debris is removed. Next, the wheat travels to a hopper and is fed through a chute down to a second cleaner known as a "scourer" located on the second floor. Here, finer dirt and debris is removed and blown outside. From there, the cleaned grain is sent to the French burr millstones, where it is ground into whole-wheat meal. The friction of the grinding process makes the meal warm. A second elevator carries the warm meal up to the third floor, where it is guided through another series of machines. The flour is spread out on the floor and cooled by a mechanized rake called the "Hopper Boy," then fed through a hole in the floor to an auger which hangs on the ceiling of the second floor that conveys the flour inside the bolter. The bolter's revolving hexagonal reel is covered with three different weaves of silk cloth that sift the flour from the cooled wheat meal and separate it into three grades. A wooden auger in the bottom of the bolter then moves each grade of flour into one of three bagging chutes that deliver the product back to the first floor.