

THESES.

Subject, A Flouring Mill

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Little did the Indian squaw, as she knelt on the banks of the Monongahela pounding a few handfuls of grain in her primitive mortar, dream that along that same river a century later would rise flour mills which exceed the wildest dreams of fancy. So time has wrought its changes.

Flour comes from the grain of wheat when reduced to powder and separated from the outer husk or coverings in which the seed is enveloped. As preparations of flour form the staple food of all civilized communities of the West, the cultivation of wheat and the manufacture of flour are necessarily industries of the greatest magnitude and importance, rice being the only other grain which rivals (and which indeed possibly surpasses) wheat in the number of human beings it feeds.

The mill we have taken as the

subject of this sketch is situated on the left bank of Pike Run creek, a short distance from the place to which it flows to meet the Monongahela. A mill was built on this same spot about one hundred years ago by James Ailes. By accident the mill was burned, about thirty or forty years ago, and was rebuilt shortly after by James Ailes. It now is owned by Mrs. Morgan and the Greg heirs and is usually called Morgan's Mill. It is not a large

mill,
having a
capacity
of only forty
barrels a
day, but it
is the one
nearest our
school
and therefore
the one
that would
be used
for observation



— Morgan's Mill —

if we were going to teach the subject.

The method of grinding wheat

was formerly almost universally accomplished between what are called millstones, and so it was in the mill we are speaking of. Millstones are often called

they are made of They may be gritstone granite. Two hard



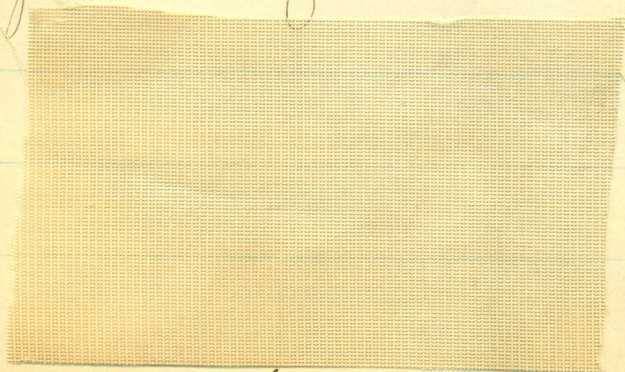
burr, but not necessarily burrstone. They may be made of and even of There are smooth stones

— Burr in Morgan's Mill now. —

formed into cylindrical shapes, from three to seven feet in diameter and eight to eighteen inches thick. They are placed one over the other having the two horizontal surfaces between them peculiarly grooved to fulfil the office which they are expected to perform. At the time these millstones were used in Morgan's Mill the mill was run by water and steam

power combined. When the water was low they used steam. At the present time it is run by steam alone and the engine used is forty-horse power.

When dry wheat is crushed as in mortar or between revolving mill-stones, the product is a powder mixed with scales, known as whole meal. The process of sifting or bolting separates the whole meal into three portions known as flour, middlings, and bran. And just here we will stop to say a word about bolting or sifting. At the present day this is done by sifting the ground wheat through silk cloth. This cloth is called bolting cloth. There are different qualities of it and the finest



Two qualities of Bolting Cloth.

is quite expensive being worth from three to four dollars a yard. Some of it is so fine and close that one can hardly understand how the finest flour could sift through it. The bran consists of the outer woody portion of the grain and adhering portions of the interior; and flour is the name given to the remainder. The latter is white, the former is reddish or grayish. This simple nomenclature was suited to the earliest forms of milling.

With refinements in the art of making bread, cake, and pastry came a demand for finer flours. New modes of milling were introduced, and the product was separated into more numerous grades. It was at one time customary in the United States to divide the product into

three grades — flour, cornell, and bran. The flour, including so much as could be separated of the requisite whiteness, amounting to some seventy per cent, was removed by bolting from the remainder; and this remainder by passing over a coarser sieve, was divided into larger scales and fragments called cornell. The latter is also known as shorts and middlings. These have been further increased by improved appliances. The grades of flour produced by the best mills are ten in number

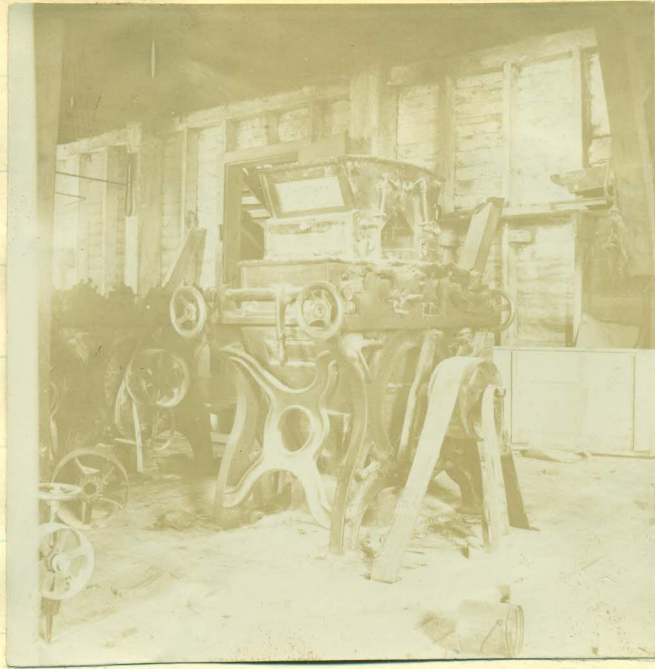
Ignaz Parr is spoken of as the father of high milling. He was born July 22, 1778, in Tattendorf, Lower Austria, and died Sept. 6, 1842, in Richtenworth, Austria. Parr made the experiment of re-grinding and separating grits, and made a flour which he called "Extract Flour"; and such was the demand for

this flour that he could not supply it.

Down to the beginning of this century, the construction of flouring mills was extremely simple. There was a single pair of millstones and a single belt of which the motive power might be wind, water, horses, or cattle. Everything else must be accomplished by manual labor; and instead of elevators and conveyors there were shovels, barrels, and tubs.

By experiments made at Minneapolis in 1878 and 1879 it was found that a system of gradual reduction upon rollers, similar to what had for some time been used in Hungary and France was of advantage in milling spring wheat. This system received a great impetus at the Millers Exposition at Cincinnati, Ohio, in 1880, and by 1887 the gradual re-

duction system had been widely adopted in the United States. In this process the millstones are replaced by pairs of gontal surfaces which are small, parallel of the



small horizontal rollers, the of part of traversed by sharp grooves to the axis rollers.

"A Roll in Morgan's Mill"

These pairs of rollers are arranged in sets of three, one above the other, with considerable intervals between, so that the heat produced by the slight crushing will be counteracted as the product passes through the air on its way from one pair of rollers to the next. These pairs of rollers are adjusted so that the crushing effect of any one pair is slight, and as many as six or seven sets, making

from eighteen to twenty-one pairs of rollers, are necessary to produce the various grades of flour. Four sets or stands of these rolls were put in the Morgan Mill about ten years ago. There is still in the mill one pair of burrs (or millstones) which is used for chopping feed and grinding corn.

One has little idea what a marvelous amount of labor is spent on the wheat before it reaches the consumer as flour. It is very rare that any considerable quantity of wheat is to be found in the market absolutely free from ingredients, such as chaff, fragments of straw, oats, sand etc.; it is rarer still to find wheat grains uniformly filled out and without shriveled or blasted kernels. There are machines which separate these ingredients from the wheat. There are

machines which separate these ingredients from the wheat. There are machines to do almost everything necessary in the making of flour and improvements are being constantly applied in simplifying the process of manufacturing, saving of power, and cheapening the cost of production. The present methods of manufacturing flour in a modern flouring mill in the United States are identical with Hungarian process of milling, excepting that in mills in the United States all manual labor is reduced to a minimum, and that machinery is employed in all stages of the process of manufacture to such an extent that the modern mill is practically automatic.

Space does not permit me to go into detail about these machines

used in a flour mill. I wish to add, however, that one of the most important things is the thorough cleaning of the wheat and the keeping of dust and particles of dirt out of the flour. The primitive savage who, in hammering out his grain on a rock, stopped to pick out a bug or a stick, expressed his idea of purification, and, for the time being, was satisfied with it; but as he looked around, he advanced, he discriminated more closely as to what he should eat or wear; he took out more of the impurities from his flour; wore better clothes, and has been doing the same thing ever since. His first efforts expressed the germ idea of milling; that is purification.

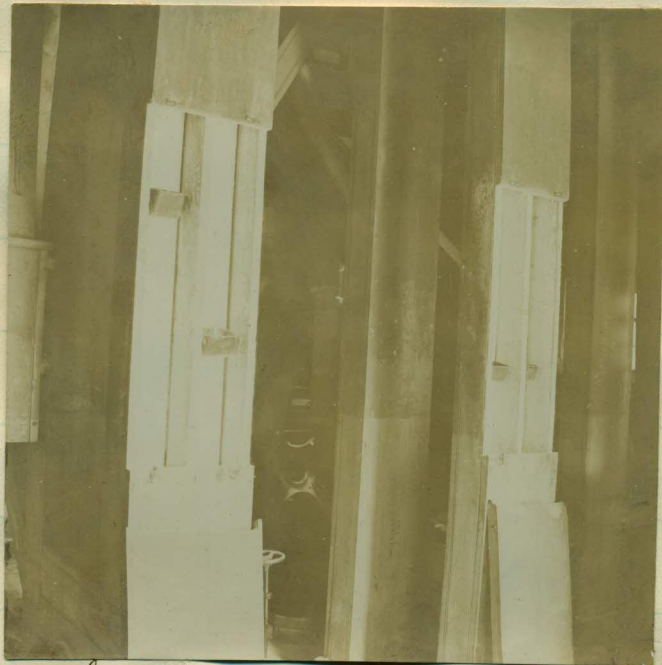
The excellence of flour may be judged in some degree by its shade of

color - the presence of minute particles of bran tending to give it a yellowish hue; by its freedom from musty odor or taste - proving that it has not been overheated and is comparatively new; and by the elasticity and tenacity of the dough which it yields when mixed with a small quantity of water, and kneaded.

To make a barrel of flour 258 lb. of clean wheat are required. Of 100 lb. of good wheat there is produced 76 lb. of flour of all grades, and 24 lb. is in the weight of bran, shorts and waste.

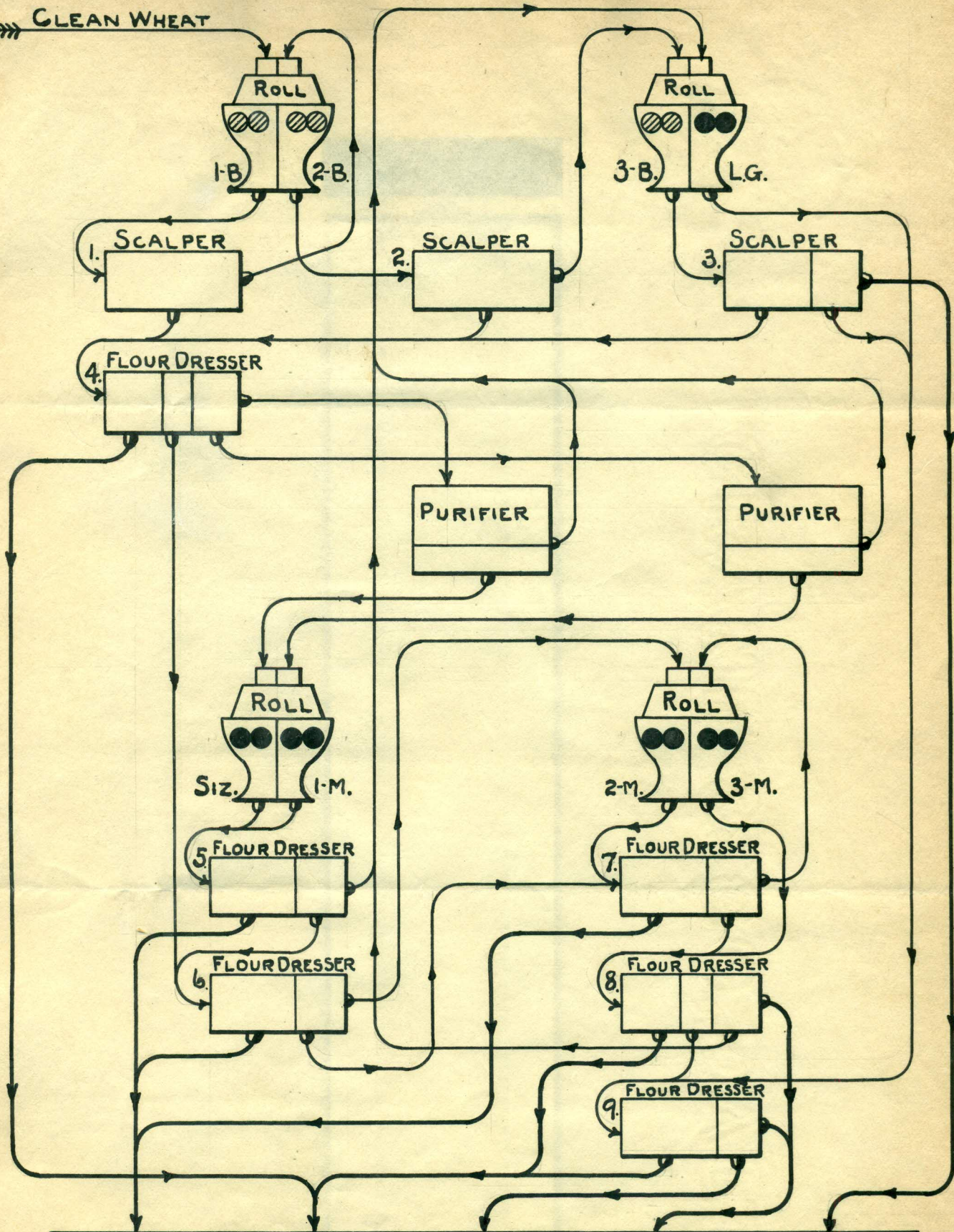


Purifier



Flour elevators in Morgan's Mill

CLEAN WHEAT



PATENT BAKERS LOW GRADE FEED BRAN

Diagram of a Small Mill