Fisher-FAllgatter Mill, 1884
Osborn Street on the Waupaca River
Waupaca
Waupaca County
Wisconsin

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
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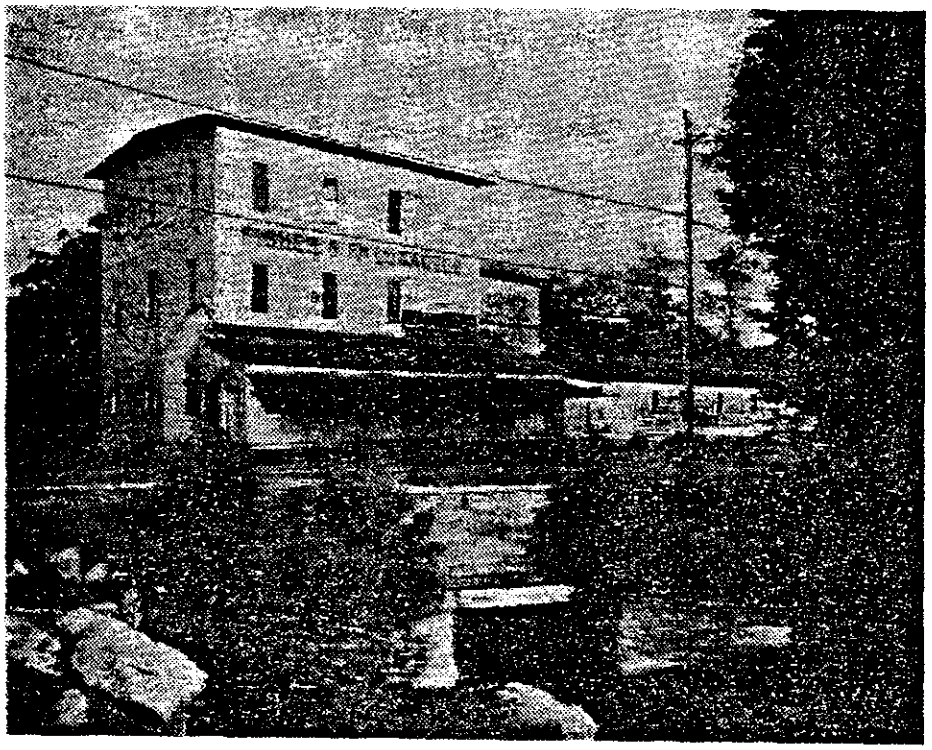
Department of the Interior
Washington, DC 20243

TECHNOLOGICAL WATERSHEDS ON THE WAUPACA RIVER : A HISTORY OF THE FISHER · FALLGATTER MILL



by
Polly Athan

STATE HISTORICAL SOCIETY OF WISCONSIN &
UNIVERSITY OF WISCONSIN · MILWAUKEE

TECHNOLOGICAL WATERSHEDS ON THE WAUPACA RIVER: A HISTORY OF THE FISHER-FALLGATTER MILL

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Supporting Agencies

State Historical Society of Wisconsin
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University of Wisconsin-Milwaukee:
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History Department
College of Letters and Science
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The Graduate School

Photography

Jet Lowe
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Carol Snook

Raymond H. Merritt
Project Director

August 31, 1979

Special Thanks to Don Fallgatter

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FORWARD

This essay is the result of five different levels of human concern for a meaningful relationship to the past. It begins at the grassroots of American society. Marjorie and Robert Paske, a couple living in a small Wisconsin community, discovered an old mill and became involved in its historical significance. They purchased the property and asked the State Historical Society of Wisconsin to assist them in preserving the technological artifact. David Donath of the State Historical Society's Preservation Office visited the mill and suggested that the building be appraised for national landmark status. He also recommended that a recording project be directed by a recognized historian of technology.

This decision initiated a third level of involvement. The Cultural and Technological Studies (CTS) program at the University of Wisconsin-Milwaukee (UWM) was asked by Donath to appraise the mill for landmark status and to produce a narrative essay on its historical significance, as well as a schematic drawing of the milling process showing the function of each machine. The history department at UWM, which has nurtured the development of courses and research in technological history, became a critical factor in providing the professional resources for this project. The positive response of department chairman David Buck, and Professor Walter Weare was instrumental in obtaining university funding and graduate student support. Dean William Halloran of the College of Letters and Science secured release time for the project director,

and Dean Norman Lasca of the Graduate School pledged salary support for the graduate students. Thus, the university was able to match funds from the State Historical Society. Dean Fred Landis of the College of Engineering and Applied Science provided office space and equipment for the staff.

A fourth source of involvement came on the federal level from T. Allan Comp and Donna Ware of the Historic American Engineering Record (HAER) in the Department of the Interior. They sent a HAER staff photographer, Jet Lowe, to Waupaca to visually record the milling machinery.

The bulk of the actual work was done by UWM graduate students from history, architecture and art history. Polly Athan dedicated much of her life over the last ten months to this project. Ms. Athan did all research, conducted interviews, and wrote the narrative, as well as coordinating the work of the other graduate students and preparing the manuscript for publication. Carol Snook, a historic preservationist working in the CTS program, assisted Ms. Athan with budget matters, planning and editing. The schematic of the mill process and the drawings of the machines were done by Gary Ebben, a graduate student in architecture. John Vogel, a graduate student in history, made two trips to Waupaca and many trips to our project office, providing the initial photographs of the mill. Two other graduate students, Lisa Rowland and Sharon Devitt, aided Ms. Athan in numerous staff discussions.

In spite of the small size of the project grant, federal and state fiscal regulations created various administrative complications

Happily, the patience and cooperative spirit of Eloise Baldauf of the Grants and Contracts Office at UWM and Robbie Regner and Barbara Wyatt of the State Historical Society guided the administrative phase of this effort to a successive conclusion. Charlotte Heise, Ruth Fowler and Myranee Hadjinian were responsible for typing numerous drafts of the narrative.

The Fisher-Fallgatter mill story is a remarkable segment in the history of Wisconsin; it also traces the significant technological transitions in our regional past. When this project began, none of us anticipated the regional and national scope of the little mill on the Waupaca River. We also did not expect that this project would involve such a complex group of local, state and federal agencies and concerned individuals in those organizations. Although Polly Athan was primarily responsible for the content of this study, the research, writing, illustration and printing of this document have provided a valuable experience for many people. We hope that reading this narrative will also enlarge your imagination and understanding.

Raymond H. Merritt
Project Director

ACKNOWLEDGEMENTS

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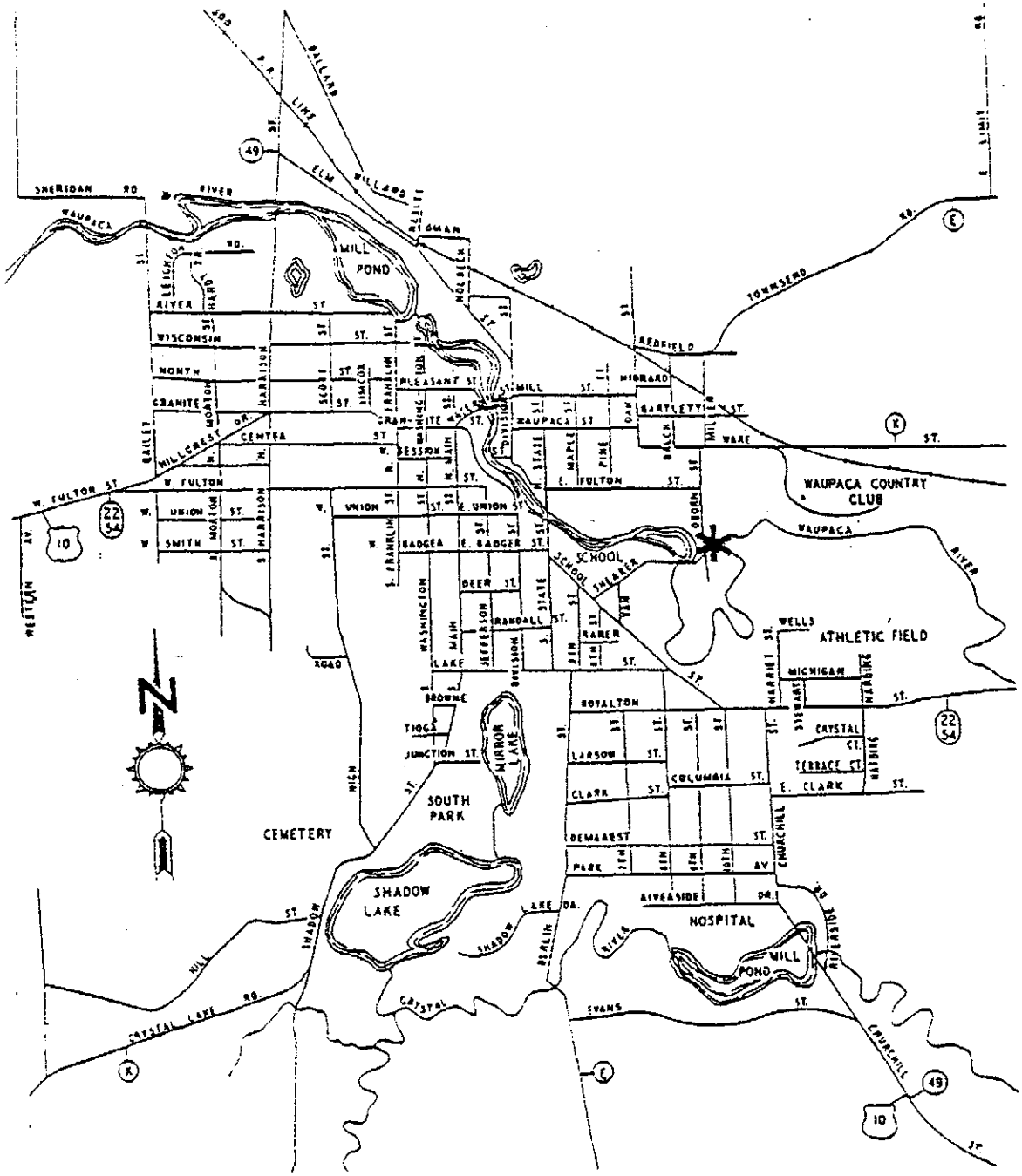


1. 1979 street map of Waupeca, Wisconsin. The star on Oborn Street indicates the location of the Fisher and Fallgatter mill.

INTRODUCTION

In 1384, Robert N. Roberts and Samuel T. Oborn built the Crescent Mills in Waupaca, a community established on the banks of the Waupaca River in the Southwest corner of Waupaca County, Wisconsin. With the assistance of a millwright from Neenah, the two men erected a three-story frame flour mill and they cut a channel across the neck of a small loop in the Waupaca River enabling water to flow beneath their mill to drive turbine-powered machines. Roberts and Oborn built their mill during a period of revolutionary change in the technology of the flour milling industry and they were able to install the latest in flour milling equipment.

Today, the Crescent Mill stands intact, although with expansion, renovation and several changes of ownership, the name has been changed to the Fisher-Fallgatter Mill. After eighty-five continuous years of producing flour for the state and nation, the mill was shut down in 1969. Fortunately the building and machines have been preserved as a testimony to Waupaca's past, to flour milling methods and machinery of earlier times, and to the historical importance of the flour mill in towns and villages throughout the nation. The following essay describes the significance of the Fisher-Fallgatter Mill.

THE EARLY AMERICAN FLOUR MILLING INDUSTRY

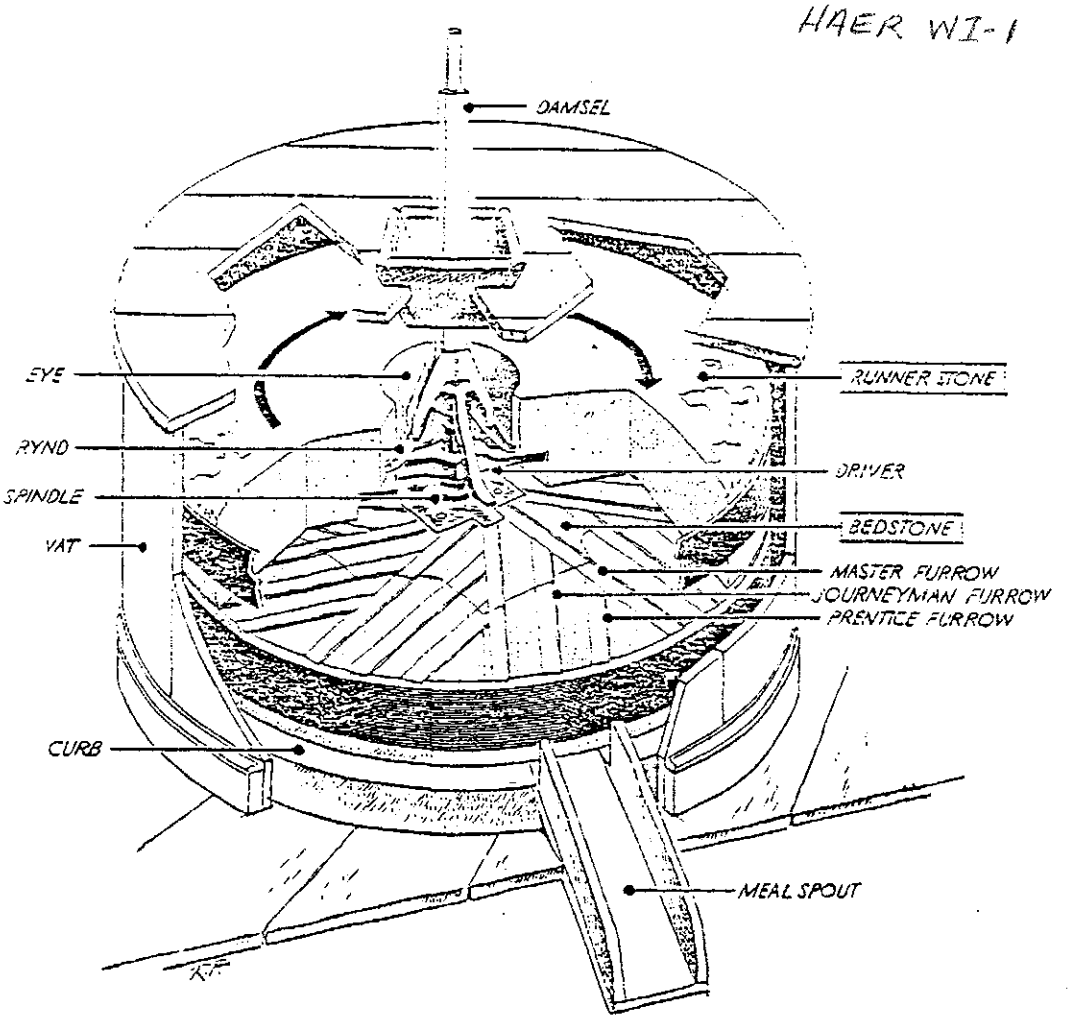
To place Waupaca's Crescent Mill in perspective, it is important to consider the development of the flour milling industry in the United States. Although Waupaca was not established until the nineteenth century, like many of America's first communities its location was determined by its potential as a millsite. Because bread was such a vital necessity to the earliest white settlers, gristmills were established with the first harvest, providing a needed socio-economic gathering place.

As grain production moved westward, so did gristmills; nearly every town that grew wheat had its own mill, and many towns were able to support more than one. By the end of the eighteenth century, small waterpowered gristmills were scattered across the countryside, producing flour and meal for local consumption from whatever grains the neighboring farmers raised. Statistics are lacking for these earlier years, but by 1850 there were 11,891 flour and feed mills in the United States.[1] Usually, the miller ground each farmer's grain on an individual, custom basis, keeping a certain percentage of the flour produced as his payment or toll.

Millstones were the heart of the grinding process; their source of power was the water that turned the waterwheels. Most mills were very small and housed just one pair of millstones. A "run of stone" consisted of a stationary bedstone and a revolving upper, or runner stone, each two to seven feet in diameter, eight or more inche thick, and weighing from 1500-6000 lbs. A millstone was either made

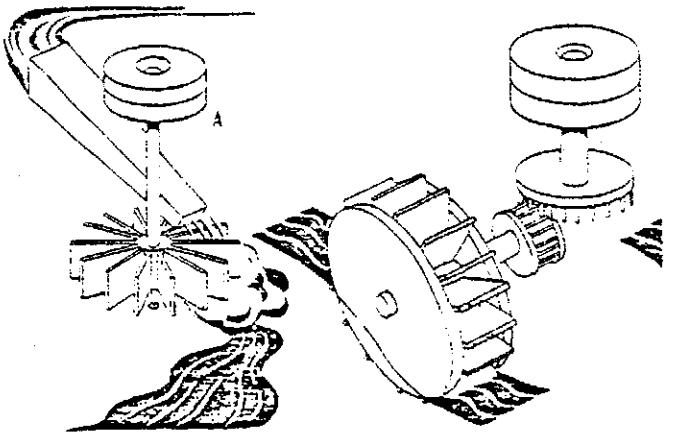
from a single, massive block of stone, or from several smaller pieces cemented together and bound with an iron hoop. The most highly prized millstones were made of quartz quarried in France. The miller "dressed," or cut grooves into the facing surfaces of each millstone to facilitate the moving and grinding of the grain fed between them from a hopper above. Then, he carefully balanced them so that they were close enough to grind the grain without coming in contact with each other. From the center of the millstones the grain moved through the grooves to the outer edges. A brush attached to the runner stone swept meal to a spout where it fell into a sack or bin. The quality of the flour produced was largely determined by how well the miller dressed and balanced his stones, and the speed with which they were driven. The common practice was to "low grind" the grain by setting the stones close together and running them fast enough to crush the grain in one grind.[2]

Most American mills used waterwheels to transmit the energy of flowing water to the millstones; both horizontal and vertical waterwheels were common until the mid-nineteenth century. The horizontal wheel consisted of a series of wood blades around a central horizontal hub. The wheel was placed either directly in a stream or beneath a flow of water directed to it by a flume (an artificial channel), and the water's impact against the blades rotated the wheel. A shaft rose from the center of the wheel to a pair of millstones above. The runner stone was mounted on the end of this shaft, which resulted in a simple, direct drive as the wheel turned.



2. Cross-sectional view of a pair of millstones.

From Hindle, America's Wooden Age: Aspects of its Early Technology (Tarrytown, New York, 1975), p. 145.



3. At right, vertical direct-drive water wheel; at left, horizontal geared-drive water wheel.

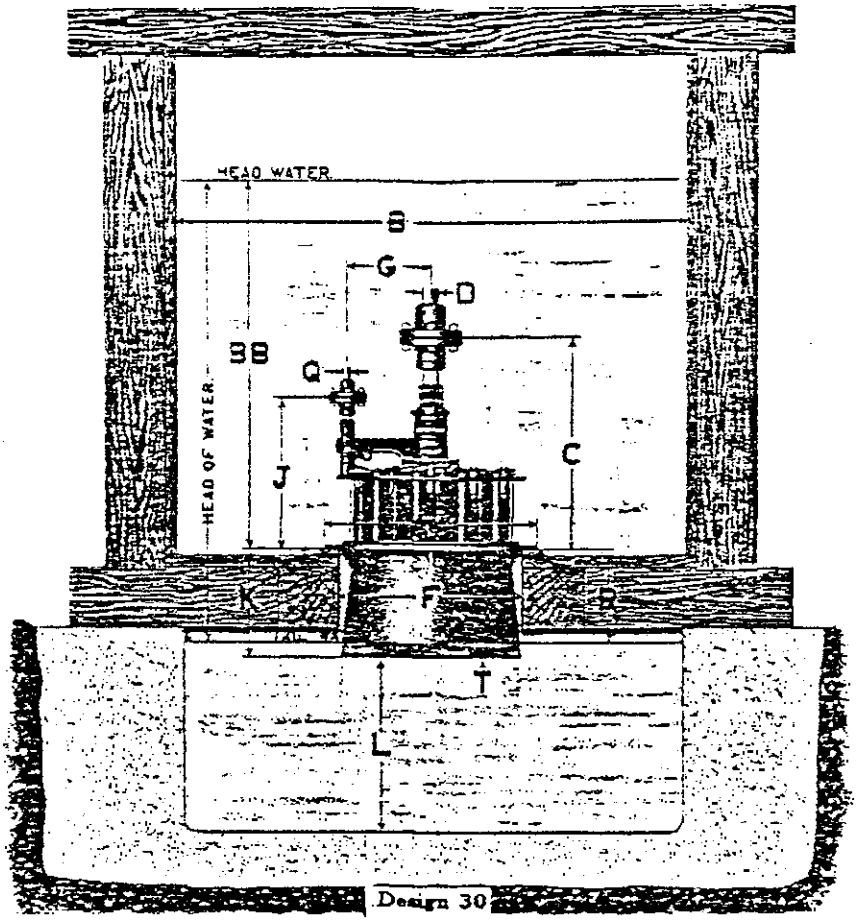
The more popular waterwheels were vertically mounted. Three variations of the vertical wheel evolved depending on the mill location. The available quantities of water and "head" (the distance that the water dropped to the point of impact against the buckets or vanes) determined whether the miller chose either an undershot, overshot or breast wheel. The most efficient type was the overshot wheel, which turned by the weight of the water that fell into its buckets from a flume at the top of the wheel. With the breast wheel, water was directed into the buckets near the middle of the wheel, turning the wheel by its impact as well as by its weight. The least efficient vertical wheel was the undershot, which was turned entirely by the impact of the water against its buckets near the bottom of the wheel; the water's weight played no part in the motion. With any of the vertical waterwheels, gears were necessary to turn the horizontal millstones, which meant that power could also be transmitted to more than just the millstones. However, until the late eighteenth century, few mills contained more than a pair of millstones and one or two simple bolting (or sifting) devices.[3]

Waterwheels were the chief source of mill power for over 2000 years, but they were discarded within one generation when the turbine was developed in the early nineteenth century. Waterwheels had several disadvantages: they were large and cumbersome, were built of wood which eventually wore out, were often inoperable in winter, and lacked control mechanisms to adjust the speed of the millstones. Most importantly, even the relatively efficient overshot wheel could transfer only about sixty percent of the water's

power to the mill machinery.[4]

The basic concepts of the turbine, impulse and reaction, were not new, but it was not until 1827 that they were utilized in an efficient turbine. The turbine acts first by the action (or impulse) of the water pushing the wheel in the direction of the water's motion, and then by the reaction of the water moving in the opposite direction as it leaves the wheel. In 1827 Benoit Fourneycn created a turbine that consisted of a revolving horizontal cylinder with a stationary horizontal cylinder placed inside of it, each with vanes curved in the opposite direction. Water was directed through the vanes of the stationery cylinder to act with maximum force on the vanes of the revolving power wheel, turning it by impulse on entering and reaction on leaving. The turbine was later modified by reversing the two cylinders: water was forced through the curved vanes of a stationary outer cylinder and was forced against the curved vanes of a movable inner wheel. The vanes were adjustable so that the flow of water into the turbine could be controlled, which made the turbine usable at sites that provided varying amounts of water.

The turbine proved to be a much more efficient form of power than waterwheels: eighty-seven percent of the total water power brought to Fourneyron's turbine passed on to the mill machinery.[5] Turbines also had a longer lifetime than the waterwheel, they could be mass produced and shipped to mills across the country, and they were much smaller and were easier to maintain. Turbines operated totally immersed in water, so they could run even under ice. By the end of the nineteenth century, turbines (and the increasingly



4. Illustration of a water turbine from James Leffel and Company's 1916 turbine catalog. The above turbine is submerged under several feet of head water; the water passed through and rotated the turbine, then entered the tailrace below.

used steam power) had become so popular that waterwheel mills rapidly became scarce.

The flour milling industry hesitated to adopt steam power technology. Their proximity to and familiarity with waterpower led millers to convert to water turbines at a time when other industries moved toward steam as a power source. Turbines were cheaper than steam engines and could furnish most nineteenth century flour mills with sufficient operating power.

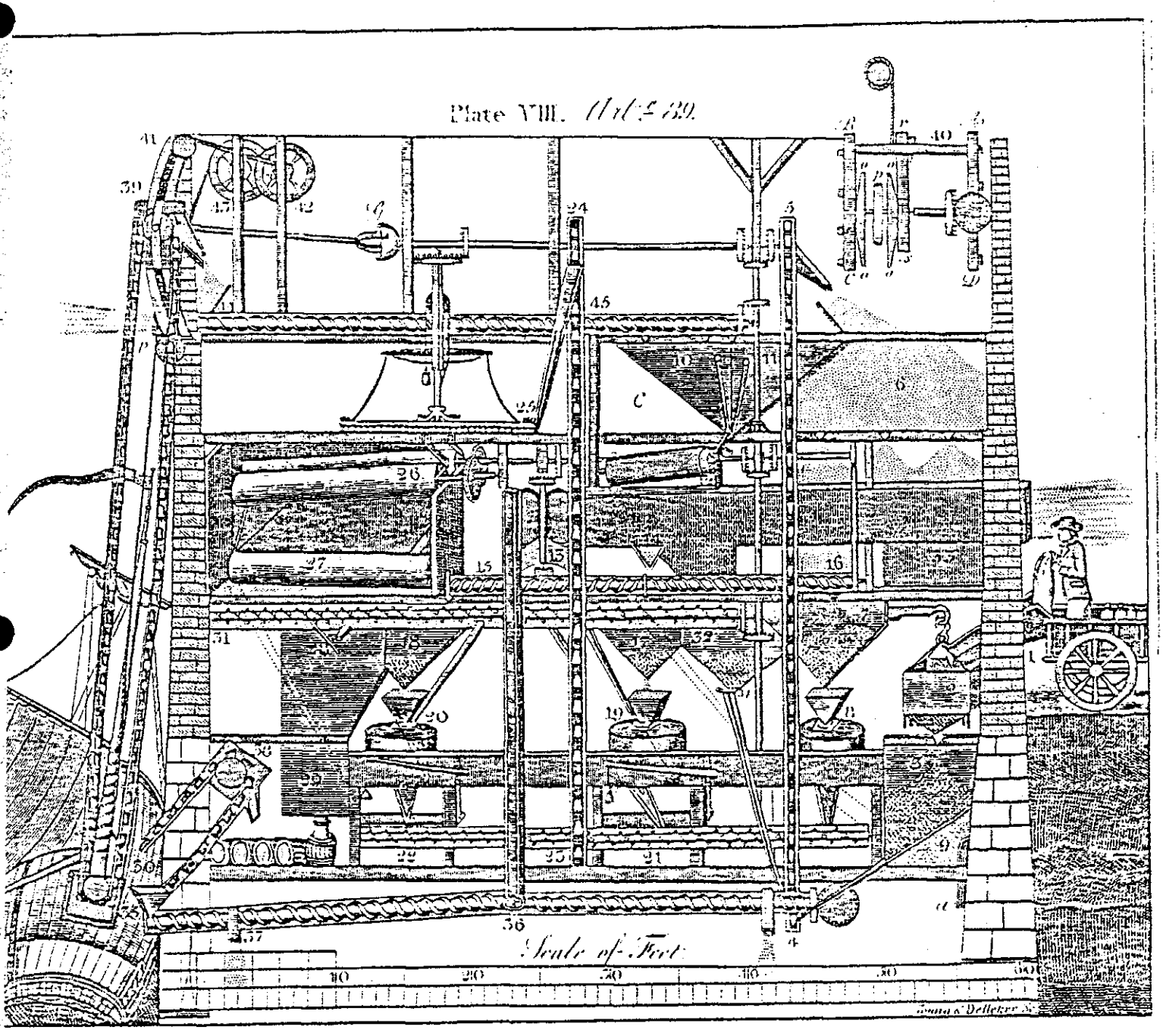
Oliver Evans' Contribution To Flour Milling

Although before the introduction of steam and turbines gristmills consisted of few milling processes or machinery, the job of milling was slow and laborious. Every movement of grain or flour required human power, whether it be emptying the grain into the hopper above the millstones, spreading hot meal out to cool after the grind, or shoveling the meal into a barrel. The labor required at each step meant that mills could not operate continuously without a worker at each stage of the process. Oliver Evans was one of the earliest millwrights to produce millstones in large quantities. He realized that flour mills wasted labor and that the flour produced varied in quality due to unsanitary conditions. Mills were not only a favorite home for rodents and roaches, but also were dusty and dirty dwellings. Shoveling ground meal on the floor to cool was a common practice. Evans wished to improve this whole process.

After contracting to build a flour mill near Wilmington, Delaware, Evans found his opportunity to create a mill that would

perform all milling operations by water, rather than human, power. By 1785, he had developed a complete system of "improvements" that transformed the mill into a totally automatic operation, creating a revolution in the flour milling industry. Evans' most important contributions were the devices that transported material from one place to another. Small buckets attached to an endless vertical belt carried a continuous, light load of grain or meal from floor to floor, chutes and movable spouts enabled material to travel down through the grinding and sifting processes by gravity, and spiral conveyors in troughs moved material horizontally. Other innovations included a hopper-boy that automatically spread hot, damp, freshly-ground meal out to cool and then slowly gathered it together again. Evans made extensive improvements in bolting operations, he submitted grain to a preliminary cleaning in a revolving screen, and he emphasized the value of air currents to clean grain. Evans also reground all of the sifted-out middlings (coarse particles of the grain kernel mingled with bits of bran) in an additional set of millstones to extract more pure flour.[6]

Evans' automatic mill produced a larger extraction of flour than other mills, with less labor and more efficiency. Fewer employees were necessary; after the grain was unloaded from the farmer's cart it proceeded automatically through all grinding and sifting operations. Initially, most millers were confused and skeptical of the complex operation, but soon they saw the advantage of a system in which grain was ground and flour produced in a continuous, automatic operation.[7] After George Washington installed



5. Diagram of a flour mill outfitted with Oliver Evans' innovations, including the hopper boy (#25), bucket elevator (#4) and horizontal conveyor (#15).

From Evans, The Young Millwright and Miller's Guide (New York, 1972), Plate VIII.

Evans' system in his mill at Mt. Vernon the process gained in popularity.[8] Installation was costly, however, and many small crossroads gristmills grinding grain for toll could not afford to adopt Evans' methods. The money necessary to build an "improved" mill, and the larger quantities of flour that these mills could produce, increased the scale at which mills could operate efficiently. The number of small gristmills declined as more and more merchant mills appeared with their higher production and increased markets and business.

The Nineteenth Century Revolution In Flour Milling Technology

An even larger revolution in the flour milling industry was yet to come. One contributing factor to the new revolution was a shift in the type of wheat commonly grown in the United States. Until the 1860s nearly all of the wheat grown in the United States was the easily ground soft winter variety. During the milling process, millers hoped to separate as much endosperm (the starchy inner part of the wheat kernel) as they could from the bran (the outer layers of the kernel) and the germ (the only seed of the kernel). The endosperm of soft winter wheats could be easily pulverized into flour, while most of the germ and tough bran remained in larger flakes easily sifted out of the flour. Millers set the millstones close together and ran them rapidly to crush the grain into flour in as few grindings as possible; then they bolted the ground stock to remove as much bran and germ as they could. The severe grinding had disadvantages; oil released

into the flour from the germ greatly shortened its storage life and hindered its baking qualities, and the heat generated by the close, fast grind discolored and damaged the flour.

During the mid-nineteenth century, new varieties of wheat were introduced that grew successfully in the Northwest. Farmers in Minnesota and the Dakotas, where winter wheat frequently was destroyed by severe weather, found that the new hard spring wheat gave them a stronger plant and a higher yield. Bakers found that spring wheat had a much higher gluten content, which gave it the strength to produce bread with superior texture and volume. Yet millers preferred the soft winter wheat that was easier to grind and that produced a whiter flour. Hard spring wheat was difficult to break using traditional techniques; it required so much pressure to crack the hard grains that the flour scorched, and the bran disintegrated into minute particles impossible to sift out, resulting in a flour flecked with brown particles that was unpopular with consumers.[9]

Millers realized that a great potential market existed for a pure white flour of standarized quality and good baking strength. Because spring wheat defied traditional grinding techniques, millers experimented with new grinding methods utilizing the new wheat varieties. They found that slowly moving millstones reduced the heat and pressure produced in the grind, and that stones set further apart cracked and rolled open the grain instead of pulverizing it into a mass of flour, bran and germ. This "high grinding" created large amounts of middlings, which were sent through a series of

successively closer grindings; this process was called "gradual reduction." Between each grind the middlings were sifted to remove the bran scraped off in the grind. High grinding and gradual reduction produced a higher yield of white flour free from bran or germ.[10]

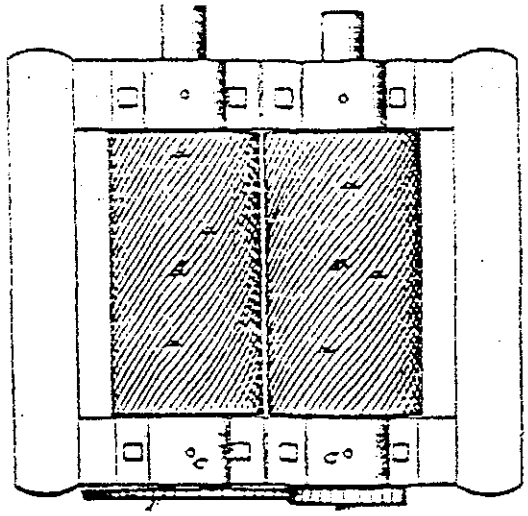
With these new techniques, millers were anxious to improve their methods of purifying the large quantities of middlings. Although much experimentation had been done in Europe with methods of separating bran from flour middlings, it was not until the late 1860s that Edmund LaCroix created his "middlings purifier." In his machine, middlings were sifted through vibrating silk-covered sieves, while currents of air carried off light particles of bran. The purifier was improved when George T. Smith added a series of traveling brushes that kept the sieves clog-free. Combined with high grinding, the middlings purifier produced a flour from hard spring wheat that could command a high price, and "New Process" flour was soon in great demand.[11]

As millers began to install the middlings purifiers and follow New Process methods, an even more significant milling process was perfected. Millstones were no longer adequate for the needs of the new flour milling industry, for they required frequent dressing and a huge amount of space and power to operate, and they did not produce a flour of uniform color and quality. For several years millers in Europe and the United States had experimented with rollers made of wood, marble, porcelain and other materials to grind grain, but not until the 1870s were steel rollers developed to do

all of the grinding in a flour mill without the aid of millstones.[12]

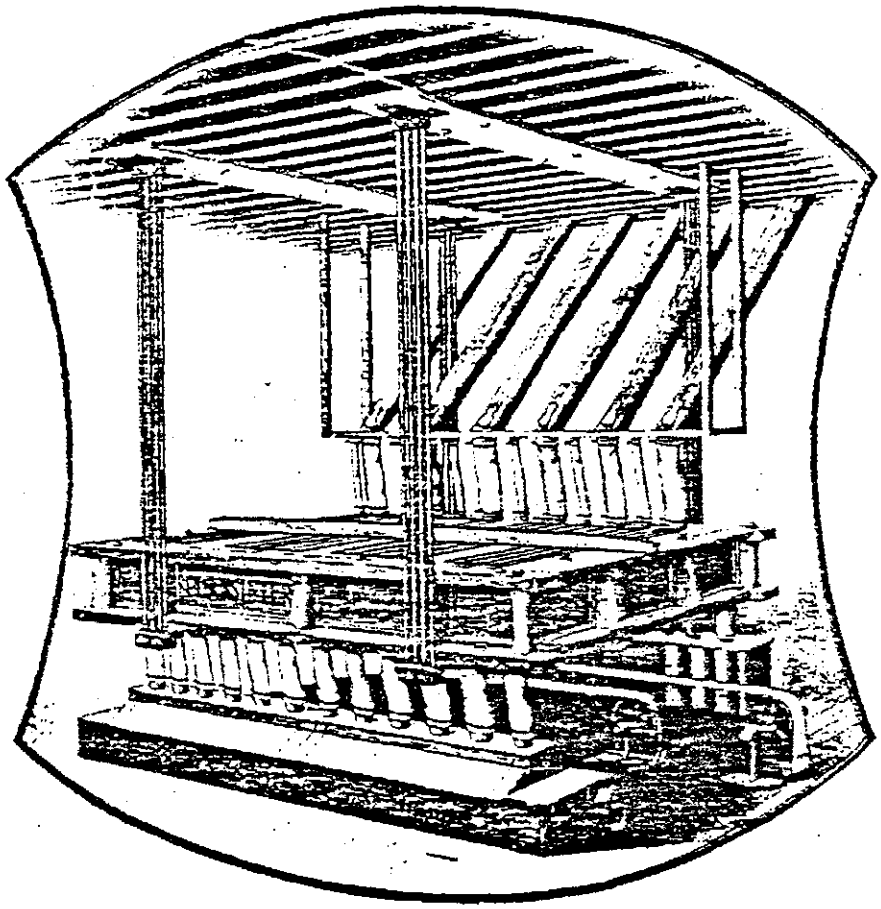
John Stevens' pioneer work with rollers was especially important. Stevens, of Neenah, Wisconsin, learned the proper methods of dressing millstones from Thomas Oborn, an English-born miller. Oborn had found that smooth-edged grooves rolled the grain open rather than crushing it, producing a better quality and higher quantity of flour. Stevens used this principle in the 1870s when he developed and patented a set of corrugated steel rollers that unrolled the grain fed between them, producing thick chunks of middlings that could be gradually reduced to flour.[13] Several years later, Thomas Oborn's grandson helped build and operate the Crescent Mill in Waupaca, Wisconsin.

Because rollers exerted considerably less pressure than millstones, and only partially ground the grain, wheat had to be sent through a series of rollers with progressively finer corrugations that gradually reduced the grain to flour and by-products. Each successive pair of rollers scraped a little more flour from the bran. Flour produced by roller mills was unequalled in its whiteness and baking quality, and millers who adopted the roller system could expect to obtain a higher yield of flour from their grain. Rollers also required less power and space to operate than millstones, and they eliminated the costly and time consuming job of stone dressing. In 1878, W. D. Gray, an engineer from Milwaukee's E. P. Allis Company, assembled the first commercially important all-roller mill in the United States for Cadwallader and William D. Washburn in Minneapolis.[14] Its great success spelled



6. John Stevens' steel rollers, patented by him in 1880.

From Lawson,"The Invention of the Roller Flour Mill," 1907, p. 250.



THE PLANSIFTER

7. In 1892, the Barnard & Leas Company secured all United States rights to

disaster for flour mills operating with millstones. During the 1880s the entire milling industry began to shift to the roller system, and the "patent" flour that this system produced was in demand across the country.

Other Nineteenth Century Developments

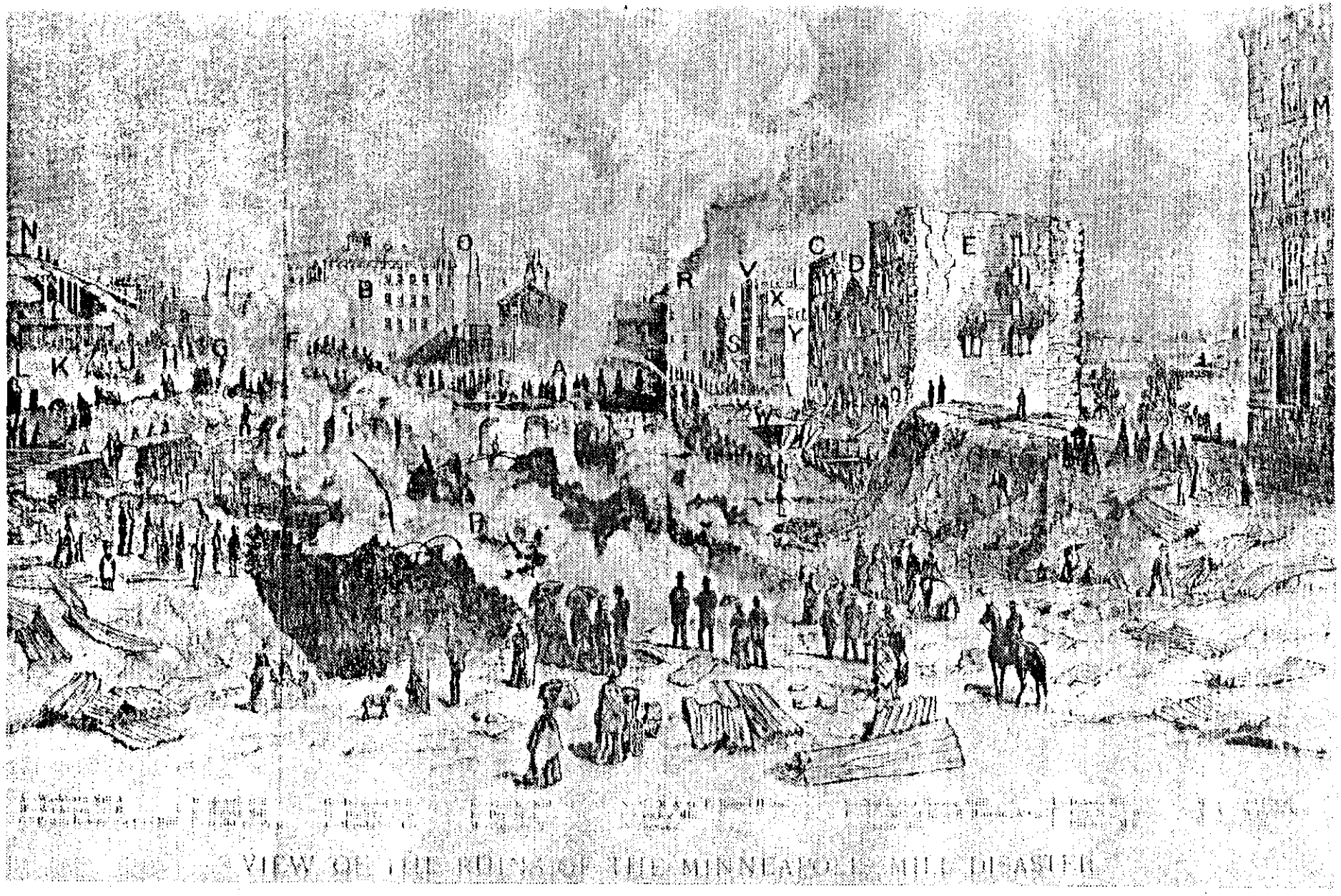
With the introduction of the complex roller mill system and gradual reduction techniques it became increasingly necessary to develop an improved system of sifting and separating ground stock. Stock separated into various grades according to size could be sent to specific rollers, corrugated to fit their size, for re-grinding. The plansifter, created in 1888 by a Hungarian miller, Carl Haggenmacher, solved the problem of stock separation by means of a series of sieves stacked one on top of each other and made to oscillate in a horizontal plane. As the nest of sieves oscillated, material moved from one sieve to another and separated into various grades of flour. Horizontal oscillation created a more efficient sifting motion than the previously used revolving reels or bolters, and the plansifter could process a much greater quantity of stock.

Throughout the nineteenth century, increased attention was given to the cleaning of grain after delivery to the mill, and a variety of grain scourers, smutters, and milling separators were introduced to clean grain, using combinations of air currents, oscillating sieves, abrasive surfaces and beaters. Other developments involved efforts to control the great quantities of dust that escaped into flour mills, to prevent waste and to protect the miller

from "miller's cough." Before the 1870s, the common dust collecting method was to exhaust dust form the machinery into an isolated room where it could settle. This procedure increased the risk of dust explosions; mill fires were common, but it was not understood that dust was the cause until the 1878 explosion of the Washburns' New Process 'A' Mill in Minneapolis. The fire killed eighteen people and destroyed one-third of the city's milling district along with lumber yards, machine shops, a roundhouse and a number of homes. Soon after technologists develcped a variety of dust collecting machines for use in flour mills, which were rapidly and widely adopted.[15]

With the general acceptance of the roller mills and other new milling techniques the production of flour by traditional methods declined rapidly. The new technology was better adapted to merchant mills that could afford to expand and to install the machinery that would enable them to process and handle greater quantities of grain. Merchant mills, instead of grinding grain on a custom basis, gave farmers cash for their grain, and sold and shipped finished flour in large quantities to bakers, grocers, wholesalers and others, both locally and far beyond their former markets. Railroads enabled merchant millers to reach distant markets more cheaply, which contributed to an increase in the size and output of flour mills.

By 1900, merchant mills produced more than ninety percent of the nation's flour.[16] The milling industry had changed more during the nineteenth century than it had since the waterpowered flour mill came into use over 2000 years before. The revolution in the technology of milling from waterwheels to turbines, from millstones



8. The Minneapolis Washburn 'A' explosion of 2 May 1878.

Courtesy of the Minnesota Historical Society.

to corrugated rolls, from slow and laborious methods to rapid, efficient ones, contributed to a revolution in the business of milling, from small mills with local, custom markets to merchant mills with distant, mass markets. The Crescent Mills in Waupaca, Wisconsin were built late enough to reap the benefits of the first revolution, and early enough to be a part of the second.

FLOUR MILLING IN WISCONSIN

It was not until the early 1800s that the United States government opened for white settlement the territory of land that became the State of Wisconsin in 1848. As farmers first entered the territory to clear land for cultivation in the 1830s and 1840s, they turned almost exclusively to wheat as a staple crop. Wheat was the ideal pioneer crop; it was easy to grow, produced high yields on the fertile Wisconsin land, and farmers were sure of a market for their surplus wheat. The settlement of Wisconsin came during a period of rapid expansion in the nation's population. The growth created a great demand for grain and wheat crops were Wisconsin farmers' major source of cash income.[17]

The advance of the railroad across Wisconsin opened more land for settlement and agriculture and gave farmers access to outside markets. With the demand for wheat and the availability of cheap land, the cultivation of wheat spread rapidly; for a few years in the early 1860s, Wisconsin led the nation in wheat production.[18] Most of Wisconsin's wheat and much of the wheat of neighboring western states passed through Milwaukee, a gateway to distant markets.

In 1862, Milwaukee became the largest primary wheat market in the world.[19]

Because of the state's early emphasis on wheat, flour mills in Wisconsin were of immediate and vital importance. The number of mills in Wisconsin leaped from 177 in 1850 to 581 in 1870.[20] Small flour mills powered by wind or water were scattered throughout the state; most millers took for their fee a certain percentage of the farmers' wheat, which they ground into flour for local sale. As time passed and transportation improved, some mills began to sell flour beyond their local markets. Large-scale merchant mills in advantageously-positioned cities such as Milwaukee or Neenah soon handled great quantities of flour, though in more rural areas small mills continued to custom grind flour for neighboring farmers. In addition to its position as the world's largest wheat market, Milwaukee also became the largest center of flour milling in the West during the late 1860s, and for several years afterward it continued to be one of the major national flour producers.[21] Milwaukee's flour industry played major roles in the growth of the city as a transportation center and in attracting related industries. The E. P. Allis Company, for example, a major manufacturer of flour milling equipment, was an important promoter of the experimental roller mill technology and was Milwaukee's leading industry for many years.[22]

Flour milling was Wisconsin's major industry from 1850 to the late 1880s, but by the end of that period both wheat growing and flour milling were beginning to move westward and out of the state.

For lack of crop rotation, many areas of Wisconsin suffered from soil exhaustion. The increasing occurrence of pests, smut, and rust, in addition to wasteful cultivation practices, led to depleted, low-yielding, unprofitable soils. Crop failures forced a diversification of agriculture, and in most areas of the state, farmers began to shift to feed crops for dairy cattle and other livestock.

Poor wheat crops in Wisconsin made competition difficult with the wheat producing states to the west that offered cheaper, more fertile land. As people moved westward and as wheat production declined in Wisconsin, many small mills closed throughtout the state. With improved transportation and milling techniques, large mills prospered. The flour milling process became more complex and expensive, and many small mills could not compete. By 1905 the number of flour mills in Wisconsin had decreased to 389, a decline of fifty percent in twenty-five years.[23] Throughout the twentieth century the number of flour mills continued to decrease. Although the buildings of some mills were converted to other purposes, many were simply abandoned and left to deteriorate. Because few flour mills remain in Wisconsin, where milling had once played such a vital role, the survival of Waupaca's Fisher-Fallgatter Mill is of special historical importance.

EARLY FLOUR MILLING IN WAUPACA

A year after the federal government opened land in Wisconsin for settlement, five men from Vermont found a "magnificent water

power and site" on the Waupaca River.[24] In 1849 the community of Waupaca was laid out amidst the heavily wooded pines of northern Wisconsin. Within a year Silas Miller built a sawmill at the center of the new settlement on the west side of the Waupaca River.[25] Although Miller's mill was essential for supplying lumber for new homes, there was a great need for a gristmill. One early Waupaca settler, Dana Dewey, recalled grinding his first crop of grain with a coffee mill and a homemade mortar and pestle. The nearest flour mill was several miles to the south, and access to this structure was difficult because of the marshy land. Wagons could make the trip only in winter.

W. C. Lord and Wilson Holt in 1851 bought Silas Miller's property, tore down the sawmill, and built a gristmill in its place. The hundred citizens were "all elated over the building of the mill, for flour was a mighty uncertain commodity in Waupaca."[27] The new "Waupaca Star Mill" was a two-story frame structure that operated year-round with three sets of millstones.

In 1857, the year that Waupaca was incorporated as a village, fifteen valuable water power sites were said to exist within one mile of the new courthouse square.[28] The Waupaca River soon supplied the power for several small saw mills, planing mills and two tanneries. The Waupaca Star Mills was of particular value, however, as it was an economic and social institution which provided evidence of the stability and growth potential of the settlement. For the farm family, going in to town to have grain ground was a pleasant diversion from the hard work and isolation of farm life. It was usually an all-day trip, as roads were poor and carting grain by wagon was a

slow affair. Once they got to the mill, farmers would often have to wait their turn to have their grain ground. The family often spent the day in town, getting supplies or visiting with others.[29]

As more people settled in Waupaca and others cleared land for farming, wheat became the major crop. Waupaca County proved to be good agricultural territory. Wheat and other grains were usually ground on an individual, custom basis; any surplus flour above local needs was transported by river to lumber camps to the north or to markets on the shores of Lake Michigan. In 1868 a correspondent for the Milwaukee Sentinel reported that Waupaca had become "quite a grain market," although the Waupaca region was still considered to be on the outer fringes of civilization.[30]

With the grain business booming, Milton Baldwin, William Dayton, and John Dewey (operating as Dayton, Dewey and Company) purchased land and water rights in 1866 to build a new mill on the east side of the Waupaca River, opposite the Waupaca Star Mills. Their new frame "City Grist Mills" was destroyed by fire in 1871, but the three men rebuilt the mill of brick during the following year.[31]

In 1872 the Wisconsin Central Railroad furnished Waupaca with the means of reaching distant markets. Although farmers continued to raise wheat, they also began to cultivate and successfully market throughout the state several other crops, most notably the potato.

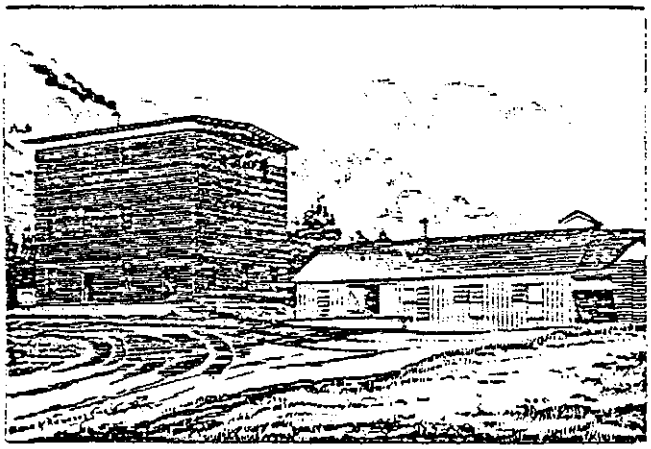
Milton Baldwin bought out his partners' shares in 1874 in the City Grist Mills, becoming the sole owner of the mill until one of his employees, Samuel Oborn, bought an interest in 1878.[32]

After operating the mill together for a few years, they installed a complete roller system, bringing the mill's daily capacity to 100 barrels of flour (at 196 pounds per barrel). On the night of January 26, 1884, however, the mill was destroyed by fire. Local firemen did all they could to save the building, but because the machinery had been in operation when the fire began, the elevator spouts produced upward drafts that fed the flames. The loss of the mill and its stock of grain and flour was estimated to be approximately $26,000.[33] With the partnership between Oborn and Baldwin dissolved, Baldwin joined Ransom Bailey and bought the Waupaca Star Mills. Baldwin and Bailey converted the building into an all-roller mill and operated it until the 1890s, when the city purchased the land and power rights to build a pumping station.[34]

The Crescent Mill

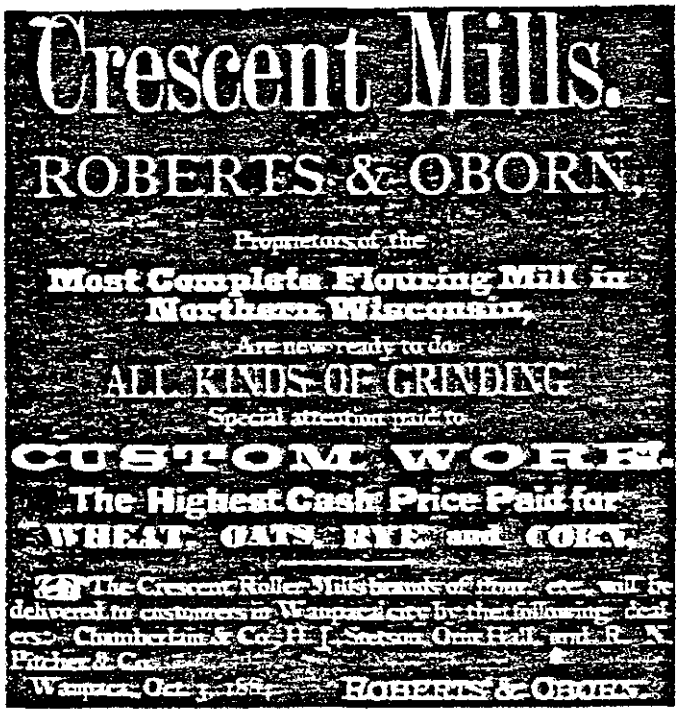
A month after fire destroyed the City Grist Mills, Samuel Oborn formed a partnership with Robert N. Roberts to build a new flour mill. The mill that they constructed stands today as the Fisher-Fallgatter Mill. Samuel Oborn was the grandson of Thomas Oborn, the miller from whom John Stevens learned to dress stone in Neenah fifteen years earlier. Samuel's father had also been a miller, and Samuel took up milling in Platteville, Neenah, and finally Waupaca, after attending school at Baldwin University in Ohio.[35]

Robert N. Roberts, born in Wales in 1842, emigrated to the United States with his family in 1844 and settled in Waupaca in



9. The Crescent Mill as it appeared in the 1880s. To the right is the old foundry and feed mill.

From Stinchfield, Illustrated Waupaca, p. 68.



Crescent Mills.

ROBERTS & OBORN,

Proprietors of the

Most Complete Flouring Mill in Northern Wisconsin,

Are now ready to do

ALL KINDS OF GRINDING

Special attention paid to

CUSTOM WORK.

The Highest Cash Price Paid for

WHEAT, OATS, RYE and CORN.

The Crescent Roller Mills brands of flour etc., will be delivered to customers in Waupaca city by the following dealers: Chamberlain & Co., H. J. Jackson, Orne Hall, and R. N. Pitcher & Co.

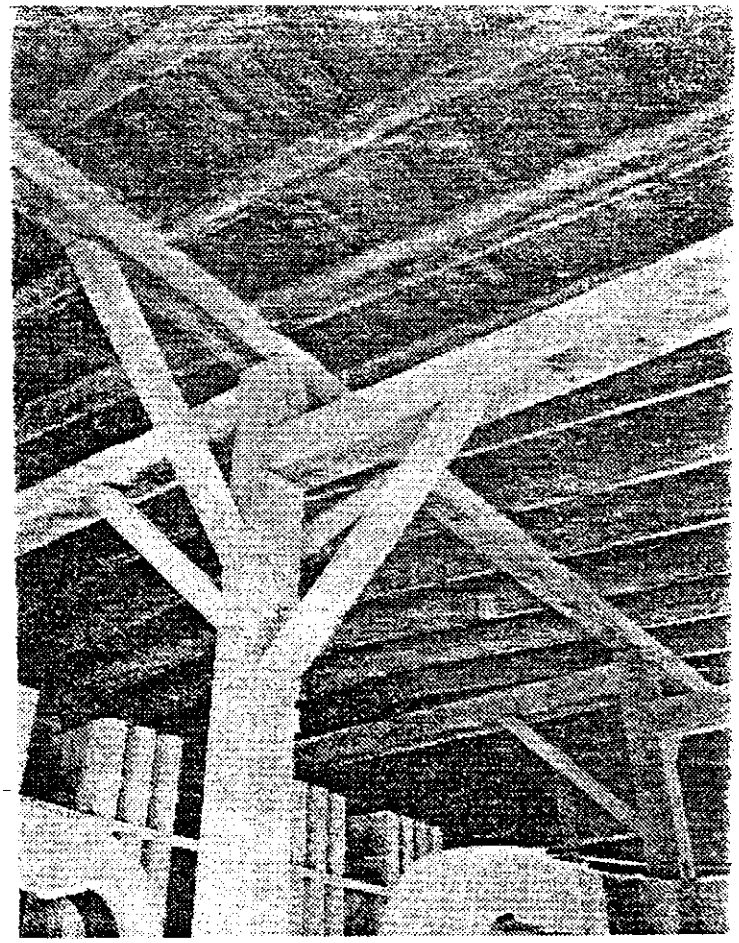
Waupaca, Oct. 3, 1884. ROBERTS & OBORN.

10. Advertisement for Crescent Mill flour, from the Waupaca County Republican, 3 October 1884.

1856. His father, Robert R. Roberts, established a general merchandise business in Waupaca, which "R. N." joined after serving as major in the Civil War. During the same year that he formed a partnership with Samuel Oborn, Roberts chartered a private bank known as the City Bank of R. N. Roberts, which operated (with several name changes) until it was forced to close during the depression of the 1930s.[36]

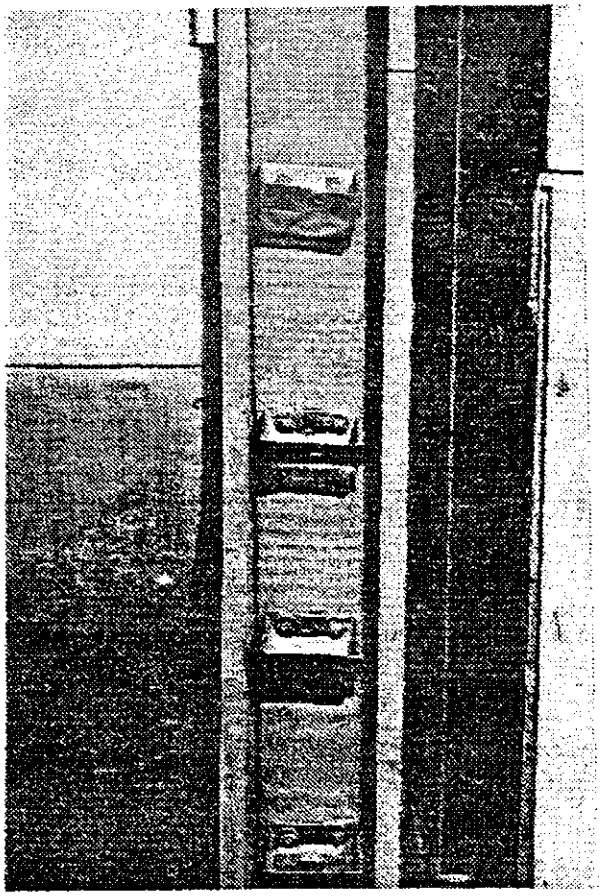
Roberts and Oborn chose a site for their mill about one mile downriver from the Waupaca Star Mills. Their land had originally been purchased by Waupaca's first doctor, Cutting Marsh. After that the land had numerous owners, one of which erected a dam and a millpond for a sawmill, foundry, and feed mill. The sawmill fell into ruin a few years after it ceased operating in 1884, but Roberts and Oborn continued to use the old foundry and feed mill buildings as a warehouse and feed mill, just south of the site of their future flour mill. The partners also acquired a two-story frame house built near the sawmill in the 1850s. It had been used as lodging for sawmill workers, and Roberts and Oborn rented this house to their employees.

The two partners cut across a loop in the Waupaca River, building a flume under the road from the millpond to the river behind the millsite. The new mill, built during the summer of 1884 under the direction of Samuel Oborn and J. Johnson (a millwright from Neenah, Wisconsin), was a forty-by-fifty-foot, three-story frame structure that cost Roberts and Oborn "upwards of 20,000 dollars."[37] The mill rested on a fieldstone foundation, and the



J. Lowe

11. Detail of ceiling construction on the third floor of the new Cresce Mill.



J. Vogel

12. Bucket Elevator

The bucket elevator and horizontal conveyor are two of Oliver Evans' inventions which were installed in the Crescent Mill.

J. Vogel

13. Horizontal Conveyor

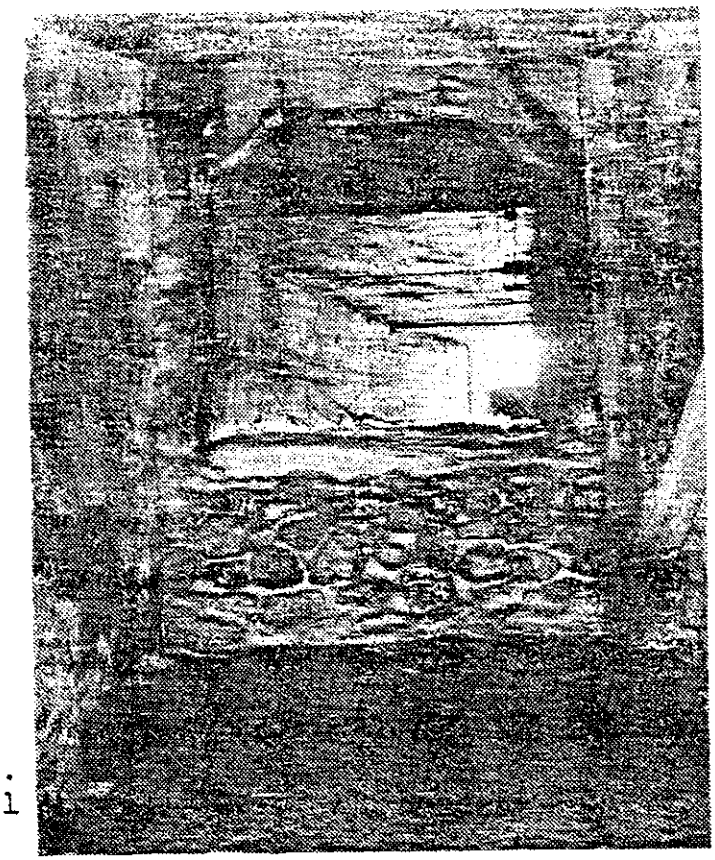
forty-five inch Monitor turbine that powered the machinery was located beneath the mill's basement under a fourteen foot head of water.

Roberts and Oborn fitted the mill with modern machinery, which included six double sets of Stevens rollers, four George Smith middlings purifiers, a Prinz dust collector, and a variety of centrifugal reels, scalping and bolting chests and grain cleaning machines.[38] The editor of the Waupaca Post considered the mill to be "the best that money, aided by a large amount of experience and a thorough knowledge of what was needed, would purchase."[39] Evidence of the flour milling innovations of Oliver Evans included spiral conveyors, bucket elevators, movable spouts and numerous wooden chutes and spouting on every floor.

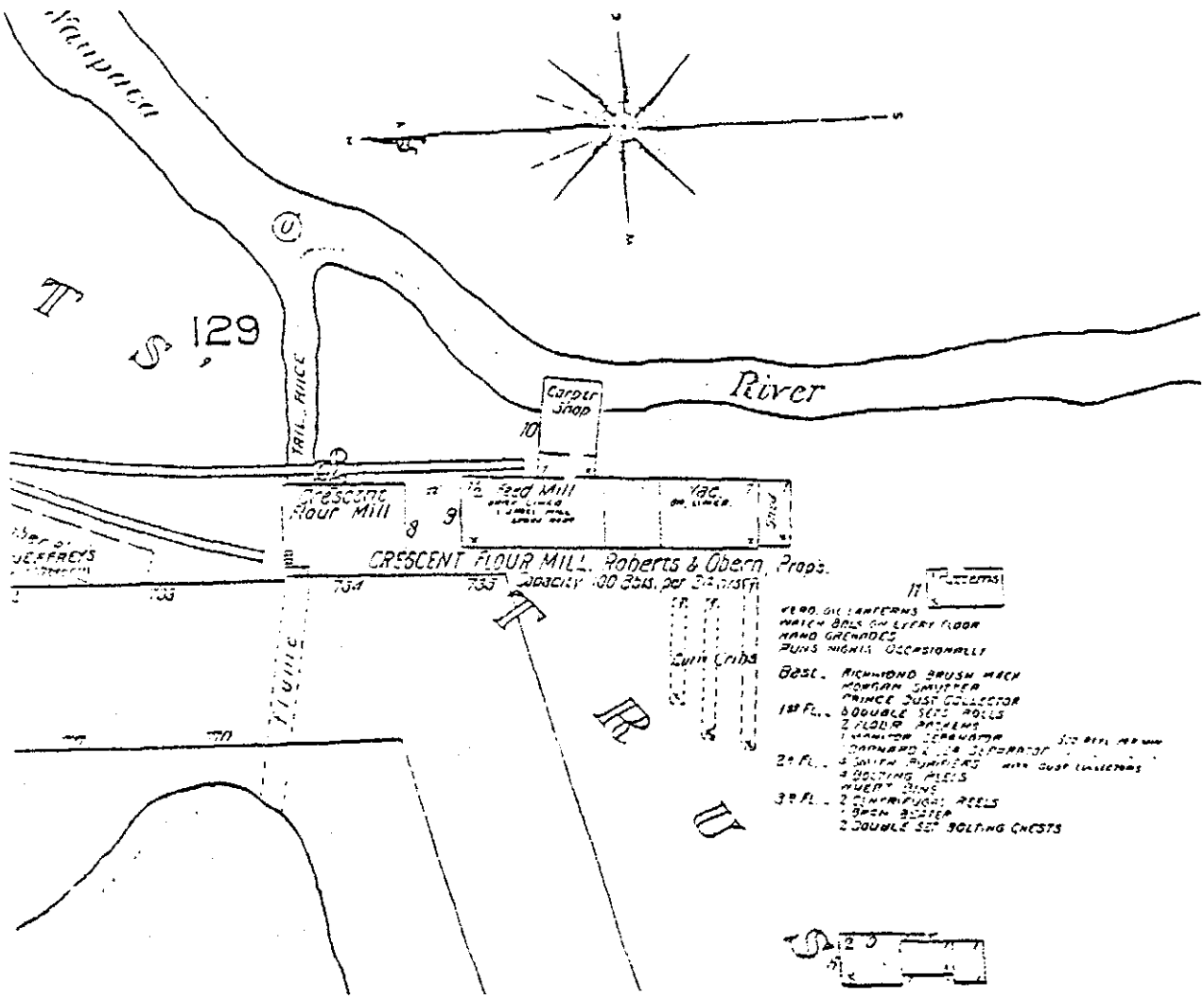
The new "Crescent Mills" merchant mill began operation in September, 1884, with a daily capacity of approximately 100 barrels of flour. The mill operated throughout the year, grinding wheat, oats, buckwheat and rye. Farmers brought in their grain by horse-drawn wagon or sleigh and either sold it to the mill for cash, feed, or flour, or requested that it be ground on a custom basis. The firm claimed that farmers could not get a better deal in exchange for their grain anywhere in the region.[40]

Wheat was the largest crop raised by area farmers and the mill turned out three brands of wheat flour: Holiday Loaf ("patent" flour), Everyday Loaf (medium flour) and Hard Tack (a low-grade flour).[41] While most Crescent Mill flour was sold locally, Roberts and Oborn contracted with the Wisconsin Central Railroad to lay a

14. Roberts and Oborn dug a flume under the road to guide water from the millpond to the turbine.



J. Vogel



15. The Sanborn-Perris Map Company's diagram of the Crescent Mill in

spur track along the side of their mill so that barrels of flour could be delivered to lumber camps and other markets in Wisconsin and neighboring states.

Oborn was in charge of the running of the mill and Roberts maintained a downtown office for the flour business as well as his other concerns. The firm usually employed three workers; one of the first, Andrew Wells, later became proprietor of the Waupaca Feed Mill, built in 1892 on the site of the former City Grist Mill.[42]

Changes of Ownership

After successfully operating the Crescent Mill for 17 years, Roberts and Oborn sold it in June of 1901 to J. C. Eilertson, former manager of the North Star Mills in Stevens Point.[43] Eilertson changed the name to the "Waupaca Roller Mills," but in April of 1902 he sold the business to Walter and Victor Fallgatter, operators of a small flour mill near Marshalltown, Iowa.

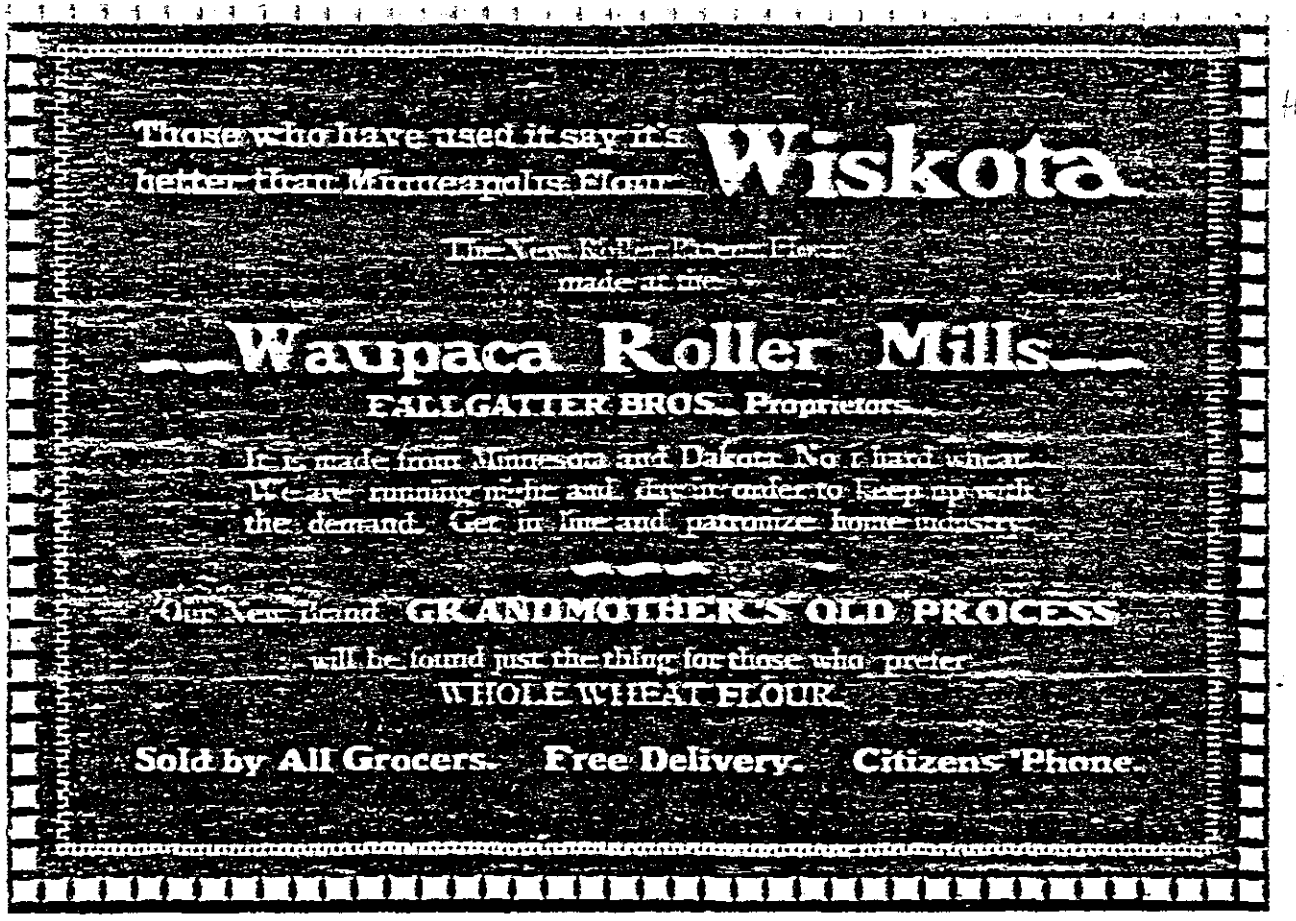
After purchasing the Waupaca Roller Mills the Fallgatter brothers hired Fred Fisher to manage the Iowa mill.[44] Fisher, born in the Waupaca County town of Farmington, had previous flour milling experience in both Minnesota and Wisconsin. In less that a year, the Fallgatters sold the Waupaca Roller Mills to Milo P. Merritt of Onawa, Iowa, and they returned to Iowa.[45] In March of 1903, Victor, Walter and a third brother, Ward, repurchased the mill from Merritt; but within a year, Victor and

Walter again returned to Iowa. Fred Fisher came back to Waupaca, and in 1905 he established a partnership with Ward Fallgatter as co-owner of the Waupaca Roller Mills.[46] Fisher supervised the milling operations and Fallgatter did the selling and bookkeeping.

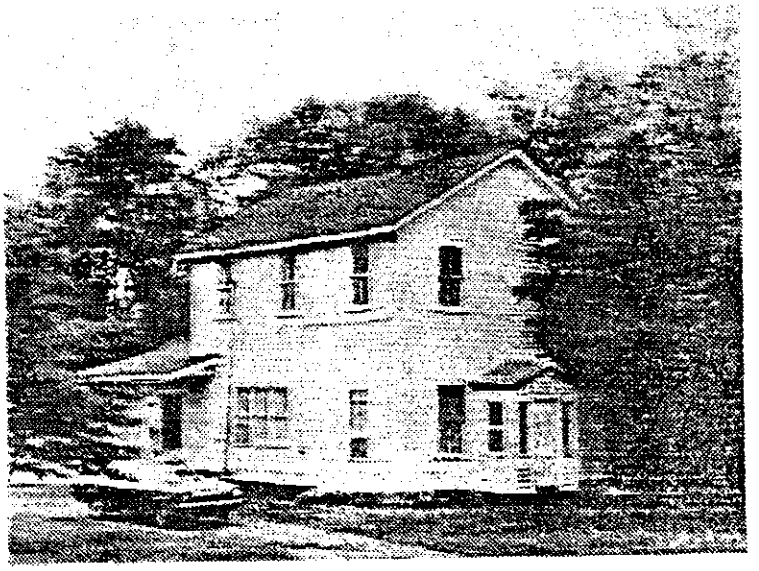
Fred Fisher and Ward Fallgatter continued to operate the business as a general mill, grinding locally-grown grain into feed and flour primarily for the 3000 people then living in Waupaca. The mill continued to operate at a daily capacity of 100 barrels of flour; this flour was packaged in wooden barrels or cloth sacks that held smaller amounts. Farmers who had grain to sell made their deliveries by wagon or sleigh, and they tethered their horses to a ring on the street side of the mill while their grain was unloaded. A watering trough was located near the millpond.[47]

Fisher and Fallgatter made extensive repairs in the lodging house, which included the addition of a new roof, new siding and new floors. The boarding house was rented to flour mill employees until the firm sold it in the early 1940s.[48] It stands today as a private residence.

During their first years as partners, Fisher and Fallgatter installed a complete electric lighting system and made several structural additions to their mill. They tore down the old feed mill and transferred all of its operations to the first floor of the main building. They bought an old potato warehouse and attached it to the north end of the flour mill to be used for feed storage. To the south of the mill they added a grain elevator capable of holding 5000 barrels of grain,



16. Advertisement for Waupaca Roller Mill flour, from the Waupaca Post, 11 September 1902.



C. Snook

17. The employee lodging house as it stands in 1979.

and an additional warehouse. They also attached a grain-receiving shed along the west side of the flour mill.[49]

The two partners gradually changed the mill from a largely local retail business to a commercial operation that concentrated on high volume and wide distribution. This shift culminated between 1910 and 1915 when Fisher and Fallgatter replaced much of the old machinery with new equipment that enabled them to ship carloads of flour by rail to distant markets such as New York City. Local sales were reduced to a minimum. With the addition of new machinery, the mill's capacity was increased to 150 barrels of flour per day. Most of the flour was shipped in cotton and jute sacks that held 140 pounds, or five-sevenths of a barrel.[50]

The pre-World War I transition of the mill also included a change to a total concentration on rye milling. There was a gradual shift in many parts of Wisconsin from wheat cultivation to other crops; rye was particularly suited to the light soils of the central part of the state. By 1913, rye was the major crop cultivated by farmers in the Waupaca area, and Waupaca County had more than seven times as much land devoted to rye than it did to wheat.[51] Most of the county's farms were small, unspecialized operations that included a crop of rye, so Fisher and Fallgatter were able to buy nearly all of their grain locally.

The mill's name was changed to "Fisher and Fallgatter," and it became known for its different grades of rye flour. The by-products of rye milling were sold as livestock feed and the mill continued to grind, mix and sell a variety of other feeds to

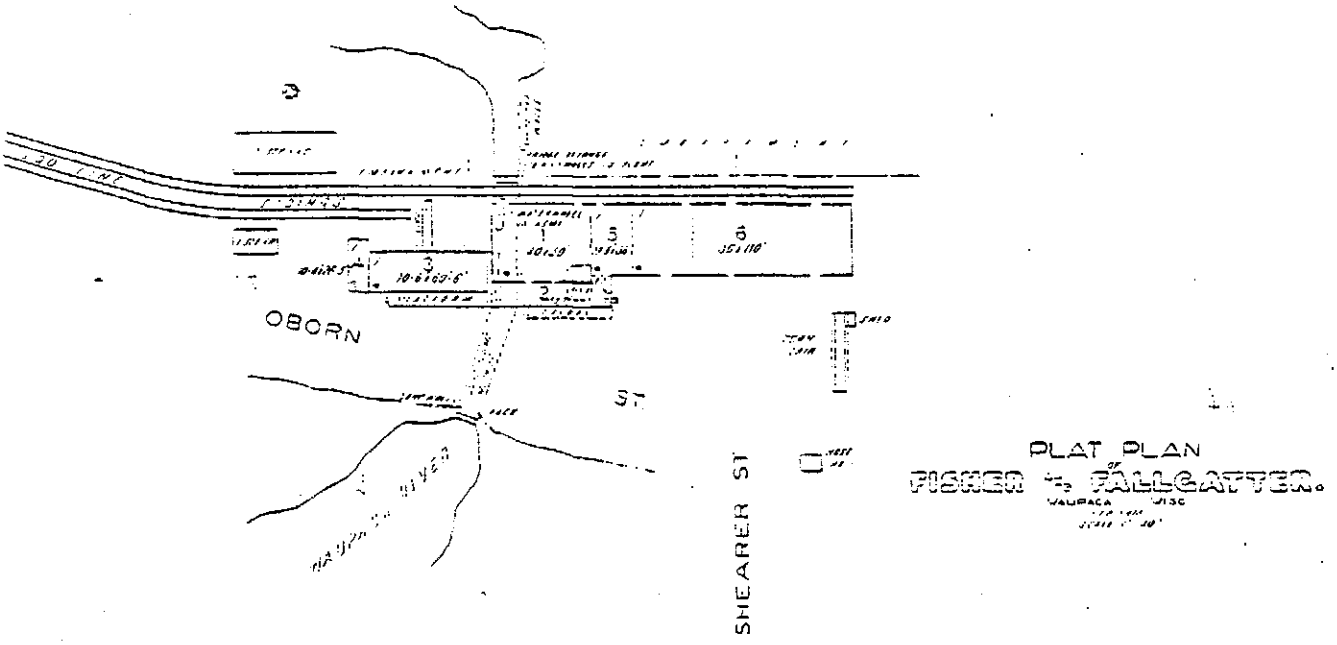
18. The Fisher-Fallgatter Mill in the early 1900s. Farmers delivered grain from their wagons into the chute on the Oborn Street side of the mill.

Photo courtesy of Evan Durrant.

local farmers. To produce these feeds the millers purchased additives such as linseed oil or soybean meal, which they mixed with corn and other grains and sold to farmers who used the feed as livestock supplements. The machine used in the production of feeds was powered by a twenty-six inch water turbine. This was mounted next to the thirty-five inch turbine that powered the flour mill machinery. Occasionally, when water was low, the miller would have to shut down the smaller turbine so that the flour mill would have enough power to continue operating.[52]

Regular milling operations were disrupted when the United States became involved in World War I. During the war, in an effort to conserve wheat flour, the federal government required that consumers purchase equal amounts of a wheat flour substitute and wheat flour. Consumers were instructed to mix wheat flour with a substitute flour when baking. In order to bake bread, rye flour must always be mixed with wheat flour, because rye lacks gluten. Fisher and Fallgatter continued to concentrate on rye milling, but in response to the government regulations they attempted to mill barley into flour, too. These efforts were not economically successful, however, and the production of barley flour was discontinued.

During World War I, the increased demand for flour substitutes led to a peak in rye production in Wisconsin. With more business due to the increase in rye cultivation and consumer demand, the partners expanded the mill's storage capacity by constructing a thirty-six by eighty foot addition to the south warehouse. After its completion, they contracted the Lloyd-Thomas Co. of Chicago to make a



19. The Lloyd-Thomas Company's 1918 diagram of the Fisher-Fallgatter Mill, showing all recently constructed warehouses.

Registered June 28, 1927. Trade-Mark 229,521

UNITED STATES PATENT OFFICE.

FISHER & FALLGATTER, OF WAUPACA, WISCONSIN.

ACT OF FEBRUARY 20, 1905.

Application filed May 29, 1926. Serial No. 112,452.

ACME

STATEMENT.

To all whom it may concern:

Be it known that Fisher & Fallgatter, a partnership consisting of Waupaca, county of Waupaca, State of Wisconsin, doing business at said city, and composed of the following members, F. B. Fisher and Ward Fallgatter, citizens of the United States of America, have adopted, adopted and used the trademark shown in the accompanying drawing, for PURE PATENT WHITE RYE FLOUR, in Class No. 46, Foods and ingredients of foods.

The trade mark has been continuously used in their business since October 1914.

The trademark is applied or affixed to the goods by printing the mark directly upon the sacks in which the goods are sold.

FISHER & FALLGATTER.
By WARD FALLGATTER,
A Member of the Partnership.

20. Fisher and Fallgatter's registered trademark.

detailed, itemized appraisal of the mill. Their appraisal included a description of the mill's construction as well as an inventory of every piece of machinery and equipment. At the completion of the appraisal in 1918, the mill was valued at $48, 578.30.[53]

The mill also prospered during the 1920s and the partners were able to purchase stock in a number of firms.[54] The partners sold most of their flour to Jewish merchants in New York City, but feed and an occasional sack of flour were sold locally and delivered in a 1916 Ford which was purchased in 1920.[55] Until the 1920s, the mill had marketed its flour under a variety of brand names, but in 1927 the firm was granted a patent for its "Acme" trademark.[56]

During the depression of the 1930s, Fisher and Fallgatter suffered losses on the stock that they had invested in during the 1920s, but the mill ran as usual except for a short period when it became necessary to reduce operating time. During normal years the mill employed three daytime workers: a miller, a sack packer and a railroad car loader. The mill usually operated twenty-four hours a day, with two shifts of employees each working from 7:00 to 7:00, six days a week. Night operation only required two employees, however; a miller and a packer were sufficient.[57] Evan Durrant recalls working at the Fisher-Fallgatter Mill in 1935 as night miller, sometimes seven days a week. Durrant, a nephew of Fred Fisher, was first hired in 1932 to sweep floors and oil machinery at a wage of $10.50 a week; he liked working at the mill and continued there until 1940 when he had to quit because of a cough that he had developed from inhaling flour dust.[58]

DON FALLGATTER BECOMES SOLE MILL OWNER

After Ward Fallgatter's death in 1936, the Fisher-Fallgatter Mill was put up for sale. Fred Fisher, Mayor of Waupaca at the time of Ward's death, was unable to devote the time and energy necessary to run the mill alone, and none of the Fisher or Fallgatter descendants had chosen a career in the declining Wisconsin occupation of flour milling. Although flour milling was one of the state's major industries when Fisher and Fallgatter became partners in 1905, the cultivation of wheat had moved to western states. Moreover, by the turn of the century the flour milling industry had begun to concentrate in large urban mills. Deprived of a source of product, many flour mills closed throughout the state. The number of flour mills in Wisconsin dropped from 705 in 1880 to 22 in 1935.[59] The Fisher-Fallgatter Mill was for sale for nearly two years without receiving a suitable offer; finally, Ward and Nora Fallgatter's son, Don, decided to "give milling a try."

Don Fallgatter was born in Waupaca in 1907, soon after his father became co-owner of the Waupaca Roller Mills. He recalls that, as the son of a miller,

> "just like my kids, we used to play around down there all the time mostly over around the river and dam, but it wasn't a place where we were allowed very much because it was rather dangerous, you know...but we always knew the fellows that worked there and we used to sneak in once in awhile."

After completing high school in Waupaca, the second generation Fallgatter continued his education at Antioch College in Ohio, where he majored in business administration and accounting. While at the college, he worked for the Hobart Manufacturing Company in Troy, Ohio, and he continued to work for them after graduation. He courted his wife, Lois, in Troy, where she taught school. In 1932 his employers transfered him to the Hobart Company in Chicago.

Fallgatter, dissatisfied with Chicago as a place to raise a family and wanting to work for himself rather than for a corporation, moved his family to Waupaca in 1938. In Waupaca, he became a co-owner of the mill with Fred Fisher. Fisher, who served both as mayor and later as a state senator, was more interested in politics than in milling. In 1943, Don Fallgatter bought out Fisher's interest in the mill, but retained the mill's "Fisher and Fallgatter" title. Fred Fisher continued to live in Waupaca until his death in 1959.

When Don Fallgatter joined the firm in 1938, the mill was still actively involved in custom grinding and selling of feed to local farmers. The mill was a lively place due to the activity generated by the feed business, for farmers came to the mill year-round to drop off grain or purchase feed. As soon as Fisher retired in 1943, however, Fallgatter decided to curtail the feed grinding so that he could concentrate fully on milling flour. The feed business demanded a lot of work for a relatively small profit. Without the feed business, the amount of

132

Inventory. April 29, 1939

Rye, 27# 35# = 43#			213736
Less Stored rye			55700
			158036
98 cwt	Spring Rye		98 cwt
13873 =	Shelled Corn	1 cwt cwt	13873
14838 =	Ear Corn	75 "	11136
1100 =	Corn Meal	1 " "	1 cwt 10
770 =	K.K.	1½ " "	385
1683 cwt	Feed Oats	35# 2 cwt	18465
2731 cwt	Seed Oats		1145
100 =	Ground Oats	1 cwt cwt	1 cwt 0
800 =	Corn & Oats	1 cwt "	960
7384 =	Barley	90 "	6645
2000 =	Screenings	40 "	800
3959 =	Tailings	1 cwt "	3959
4 =	Cod Liver Oil	3 "	1 cwt 0
136 =	Scratch Feed	1 cwt	189
3010 =	Salt	70	2107
175 =	Charcoal	1 cwt	200
560	Oyster Shells	75	4 cwt 0
285	Calcium	70	200
1000	Milorganite	150	1500
18 cwt	Alfalfa Leaf Meal	19	345
1098	Wheat	90 cwt	1647
525	Chick Starter	180	945
39 cwt	Meat Scraps	275	1078
9660	Soy Bean Meal	271	13028
3300	Cuttings Gluten	211	3580
6100	Regular Gluten	211	7605
5170	Bran	125	6462
1400	Acme Dairy	123	1610
1900	Germ	120	2280
400	Peanut Meal	110	440
13900	Brewers Grains	185	13031
5500	Wheat Middl	125	6875
360	Growing Mash	180	648
3500	Ridding	271	4725
1042	Liquid Meal	45	2300
900	Wheat Tins	2500	11 cwt 25
725	Lime	1 cwt	725
93	Bone Meal	725	2320

21. Listed above are some of the additives used in the Fisher-Fallgatter feed operation. Included in this 1939 stock inventory is the quantity (in pounds) on hand of each additive and its value.

activity at the mill greatly decreased (although the millpond was always an attractive fishing spot for neighborhood children). After 1948, farmers seldom visited the mill except to deliver rye during the harvest in late July and August. Fallgatter sold the feed machinery and equipment, along with the turbine that powered them, and emptied the feed storage warehouse so that it could be used for miscellaneous storage.

When he began in 1938, Fallgatter continued his predecessors' practice of buying the majority (about 70%) of his rye supply locally; however, as the years passed, fewer Waupaca area farms grew the crop. Throughout the century, the small, diversified farming operations in the area were gradually changing to large, specialized farms, and it became increasingly difficult for the Fisher-Fallgatter Mill to find large quantities of local rye. Therefore, Fallgatter was forced to buy greater quantities of rye from the Minneapolis Grain Market; rye that was usually grown in the Dakotas or western Minnesota, and had a darker color than that grown in Waupaca County's sandy soil. When milling rye flour, Fallgatter tried to maintain a certain mixture of western grain and local grain by drawing off a set proportion of each from their separate sotrage bins. At the beginning of each year, the miller estimated the amount of western and local rye that he would take in, and during the year he would attempt to maintain a standard ration in grinding so that the mill's flour would be fairly uniform in color and quality.

All of the rye that went through the Minneapolis market was federally inspected and graded. Fallgatter never purchased any

Rye

Grade requirements for Rye

Grade No.	Minimum test weight per bushel	Maximum limits of--			
		Damaged kernels (rye and other grains)		Foreign material	
		Total	Heat-damaged	Total	Foreign matter other than wheat
	Pounds	*Percent*	*Percent*	*Percent*	*Percent*
1	56	2	0.1	3	1
2	54	4	.2	6	2
3	52	7	.5	10	4
4	49	15	3.0	10	6

22. The Wisconsin State Grain Commission's standard rye grades. Don Fallgatter purchased only grades 1 or 2.

From "Handbook of Official Grain Standards," 1952, p. 55.

23. The "Acme" trademark on a Fisher-Fallgatter flour sack.

G. Ebben

100 Lbs. Net

Medium Rye Flour

Fisher-Fallgatter Milling Co.
Waupaca, Wis.

24. Identification cards such as the above were stapled to bags of flour.

grain that was graded less than Number 2 milling rye, which meant that the rye kernels were plump and of good quality. Plump rye kernels are more profitable, as they yield a higher percentage of flour and fewer by-products. By purchasing Number 2 or better rye, Fallgatter usually counted on extracting approximately seventy-five percent flour and twenty-five percent by-products from the grain that was milled (at higher extraction rates, the flour produced was darker and more fibrous).

Out of approximately seventy-five percent of the grain that was manufactured into flour, Fallgatter produced white, medium and dark rye flour. However, he was not able to manufacture all three at one time. If a buyer ordered medium rye flour, all seventy-five percent of the flour produced was mixed together as it came off of the sifters. However, if a buyer ordered white rye flour, what he received was the purest sixty percent of all the flour from the grind separated from the remainder, which was sold as dark rye flour. Thus, dark flour could only be milled as a by-product of the production of white rye flour. Fallgatter also ground coarse rye meal, which bakeries used in making pumpernickle bread. In order to produce rye meal, grain was ground through a special pair of rollers, and then immediately sacked for sale.

Don Fallgatter could always tell the quality and grade of his flour by feel, which required a great deal of expertise. A sample table was located on the first floor for the miller to check the grade of finished flour by touch and sight; if the flour was off-grade, he could usually remedy the problem by adjusting

the rollers. Good ears were also important in running the mill. One of Don Fallgatter's employees, Larry Pagel, remembers that as Fallgatter sat in his office he could tell if all of the mill operations were proceeding normally by the hum of the machines, and would hurry out at the slightest change of sound.[60]

The profits of Fallgatter's merchant rye milling business varied year to year. Fallgatter remarked that running the business "was a struggle, although over the years we always made a reasonably good living; I guess there was only one year in the thirty-some years I was there that we operated at a loss." The mill was not greatly affected by World War II, largely because it was a rye mill; the government created price controls for certain grains such as wheat, but rye was only included for a brief time near the end of the War.

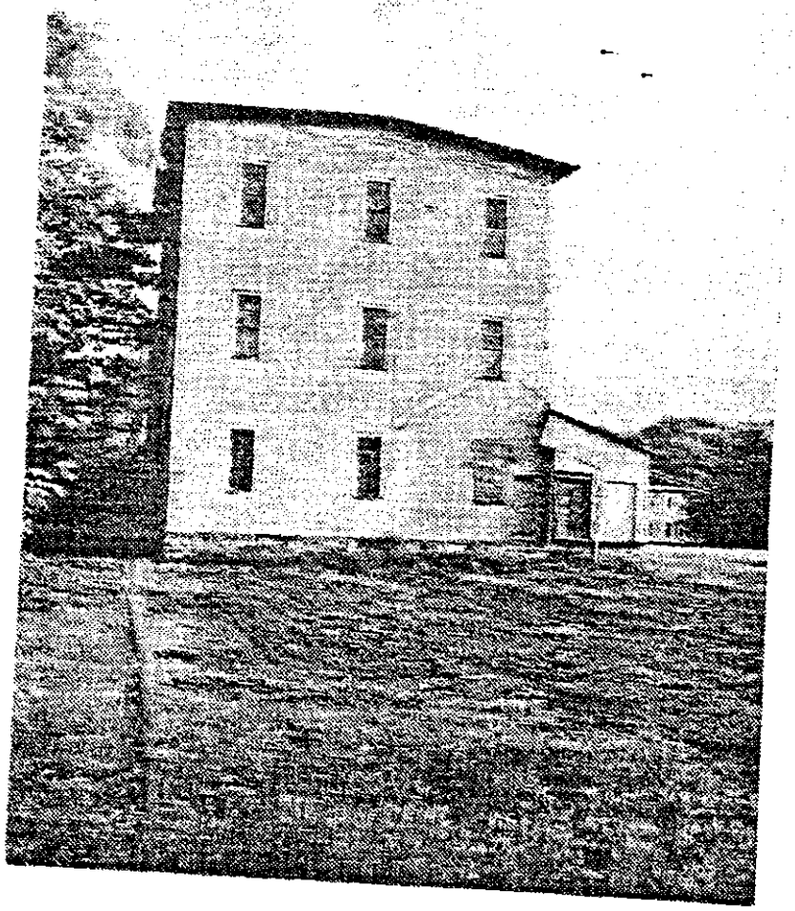
The mill was at the mercy of the markets, however, and the markets were very volatile. Prices of grain changed every day (sometimes several times each day), and wild fluctuations occurred with setbacks such as crop scares, bad weather and grain scarcities. Fallgatter recalls that as the years passed, the government started to control grain fluctuations, so that the risks were reduced to some extent.

The Fisher and Fallgatter Milling Company sold its railroad carloads of flour to large bakeries or to jobbers who bought and stored great quantities of flour and then resold it in smaller amounts to small bakeries. A buyer would usually make a contract with Fisher and Fallgatter to purchase whatever their own projected

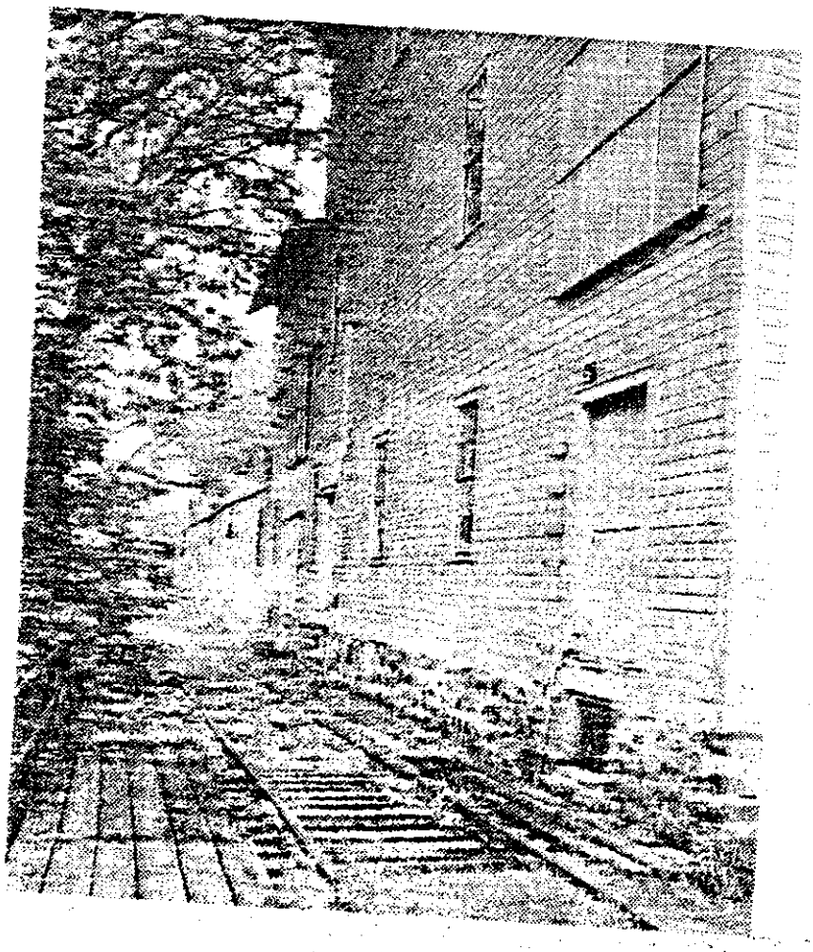
flour requirements would be for the following 120 days. Upon purchasing the flour, the buyer could then request delivery at any time during the 120 day contract, but he was required to give the mill shipping instructions at least ten days in advance. This ten day period allowed the mill adequate time to grind and package whatever finished flour was not on hand to fill the shipment. In manufacturing the ordered grain, Fallgatter could never be sure beforehand of what price he would be able to get for the feed and any low grade flour produced in the process. Consequently, changes in the price of the different grades of flour and feed during the contract period could result in a loss for the mill.

All contracts for flour were based on the railroad shipping rates that were in effect on the date of sale. Any increase in shipping rates after the contract was made was the responsibility of the buyer, rather than Fisher and Fallgatter; however, Don Fallgatter claims that rate increases were infrequent and usually minor. The charge of transporting flour was dependent upon the weight of the flour and the distance it was being shipped.

In his early years as miller, Don Fallgatter sold most of his flour to bakers and jobbers in four cities: New York, Chicago, Philadelphia and Cleveland. He sold none of it in Waupaca unless a local person came to the mill and wanted a small sack; however, this was discouraged. Fallgatter dealt through brokers in each of these four major cities; the brokers represented different mills and sold to carload buyers on a commission of a certain amount per sack. During the years that Don Fallgatter operated the mill, buyers



25. A Soo Line spur track approaches the mill from the north.



26. The track runs along the east side of the mill, enabling railroad cars to be loaded and unloaded.

increasingly requested paper sacks holding 100 pounds of flour, although occasionally they ordered cloth sacks holding 140 pounds. In an average week, Fallgatter sold three railroad carloads of flour and feed, each containing approximately 400 sacks. The mill's average annual sales often went beyond six million pounds of flour and feed.

During the 1940s and 1950s, the large New York City Jewish trade for Fisher and Fallgatter rye flour began to diminish due to the opening of large mills in the east and to increased freight rates. For several years, the other three major market cities filled the void.

In addition to the flour sold to large urban bakeries and jobbers, Fallgatter sold a great deal of flour to the DuPont Company for use as a base in the manufacture of dynamite. Although DuPont purchased the flour at a lower price, they bought flour of a higher percent extraction of the grain (95% as compared to 75%), and had fewer quality restrictions because their flour was not destined for human consumption. Because of this, sale of flour for industrial use was profitable.

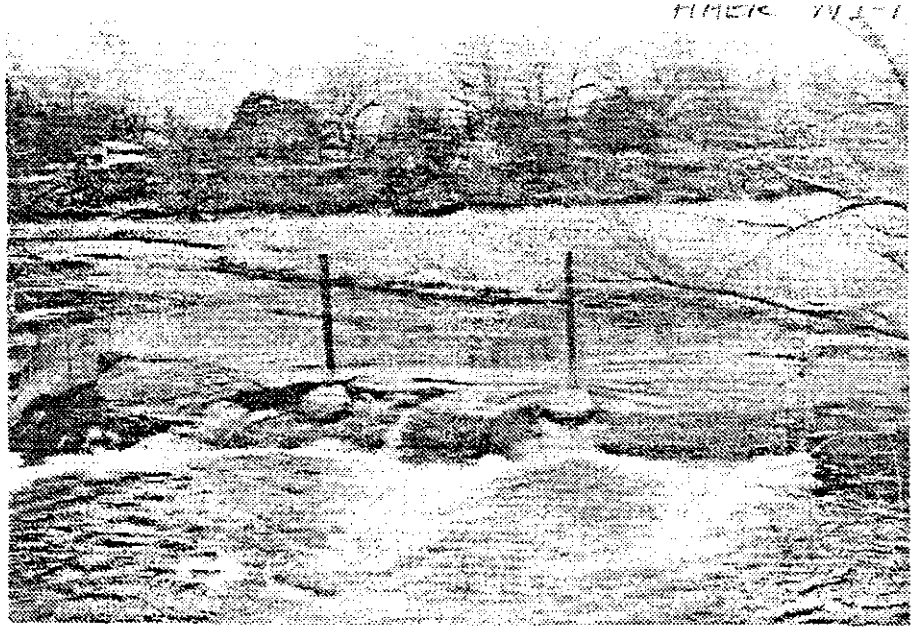
Maintenance of the Mill and Dam

The mill itself provided a lively environment for the employees. Some of the milling operations were noisy and caused the entire building to vibrate.[61] In the winter the mill could get quite cold, although a furnace was located in the basement and some of the machinery generated heat. The risk of dust explosion was

controlled by dust collecting machines and frequent floor sweeping, but workers were cautioned not to smoke. However, this rule was never strictly enforced. Barrels of salt water, pails and a few fire extinguishers were located throughout the mill in case a small fire started.

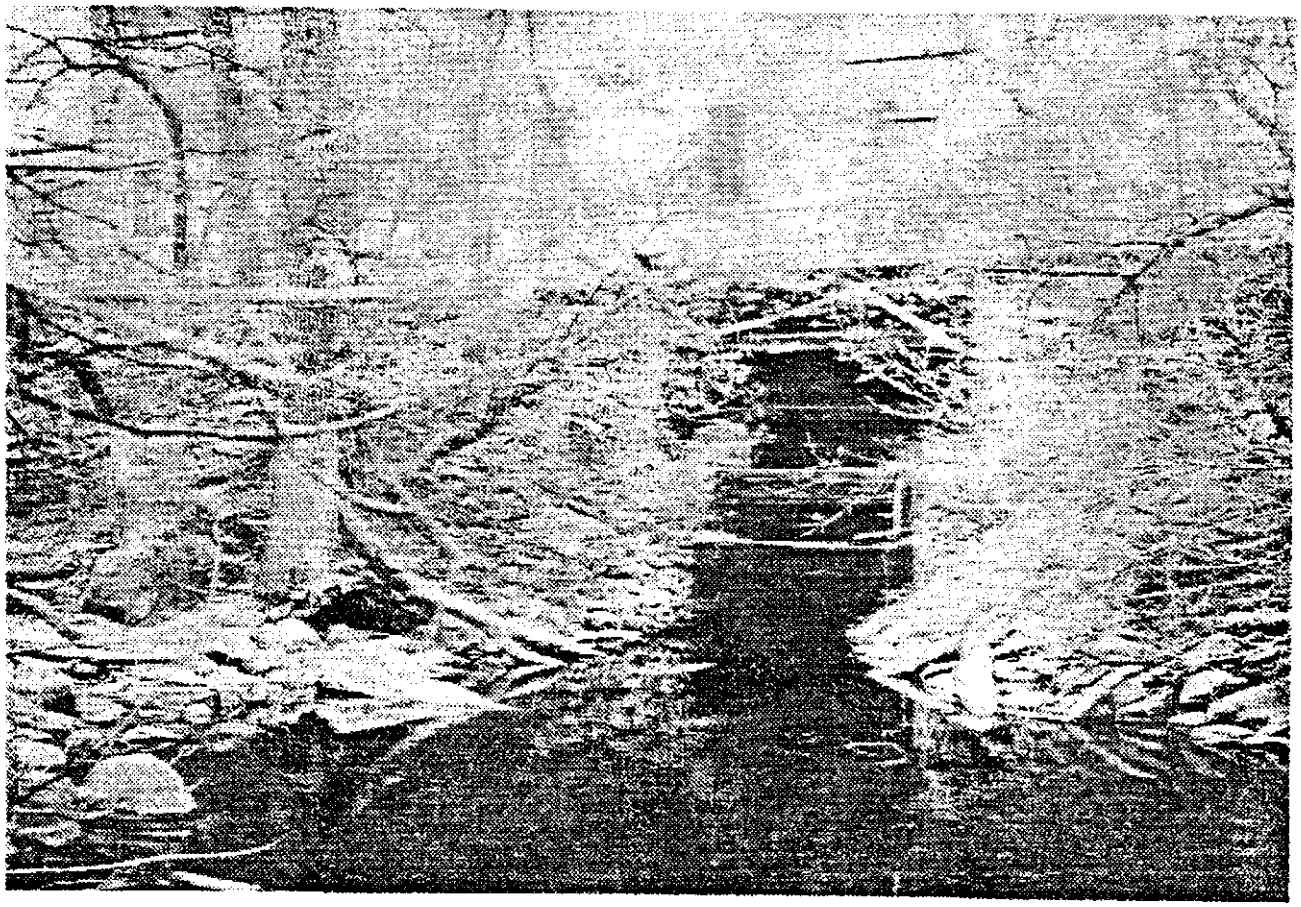
Occasionally, the mill was inspected by state officials for evidence of insect and rodent infestation. In the early days of Ward Fallgatter and Fred Fisher's partnership, cats were used to control the rodent population,[62] but in Don Fallgatter's time, the mill required regular fumigation. Fallgatter remarked that "we used to fumigate regularly with cyanide, and in parts of the mill these people would use...I forget the technical name for it, but it's teargas. In some parts of the mill that was more effective." In order to fumigate the mill, Fallgatter hired specialists, and took many safety precautions. Fallgatter recalled that "we used to tape all the windows and doors and every possible place where air could get in or out and then they'd pump it full of cyanide on a Friday night, and then let it stand until Monday morning and air it out."

Other maintenance efforts concerned the weir, which was commonly called the dam. Constructed of two-by-eight-inch boards, the dam created the millpond that provided the water for the turbine during the operation of the mill. When the mill was idle, the millpond replenished itself. Because the flow of the Waupaca River is not uniform, the dam required frequent height adjustment. By adding or removing boards from the dam the depth of the millpond



G. Ebben

27. The remains of the dam in 1979.



J. Vogel

28. Water left the mill through a concrete and stone tailrace. Wooden posts help support the railroad bridge above.

could be controlled. During occasional cold snaps in winter some of the Waupaca River's feeder streams and springs froze, shutting off the supply of water. When that happened, the mill was unable to operate for a day or two until the water ran again. With spring came the risk of further difficulties; the dam occasionally broke due to flooding ice and increased river volume. Fallgatter and perhaps one or two employees would have to stand in the icy water to make repairs.[63]

The miller always tried to maintain the pond at a certain level to insure a predictable flow of water to the turbine so that the mill could operate at a steady rate. If the turbine speed indicator inside of the mill showed that the turbine was slowing, due to declining water, Fallgatter knew there must be problems. Occasionally, the steel rack at the entrance of the flume became clogged with sticks, leaves and other debris that simply had to be raked off to allow water to pass through to the turbine. If the millpond was low, the turbine revolved slowly; this was usually due to weather conditions and Fallgatter could remedy the problem by adjusting the height of the dam to impound more water in the pond. Sometimes, however, the problem was caused by manufacturies upstream that were diverting so much water that the river level fell. In that case, the miller would shut down the turbine and wait for the pond to fill again.[64]

The Fisher-Fallgatter Milling Co. Closes

By the early 1960s, Fallgatter had lost most of his buyers in the East, and he was gradually losing his markets in Cleveland and Chicago, too. Explaining the reasons for the loss of business Fallgatter remarked that,

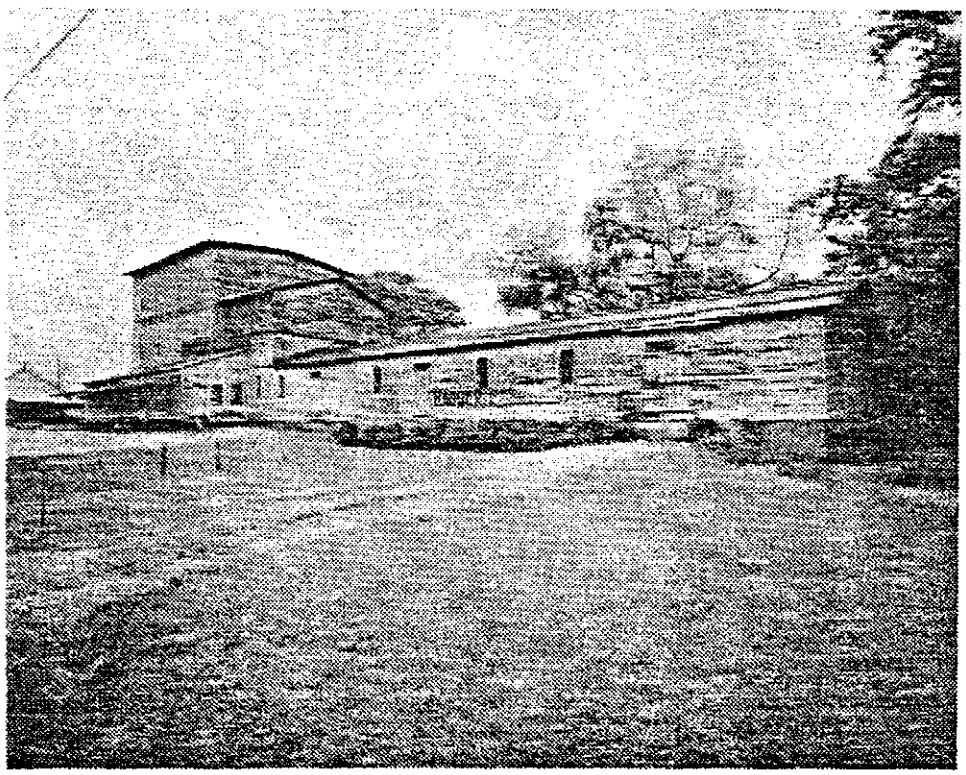
> "the handwriting was on the wall for a number of years before I quit because of changing methods of packing and shipping flour; the big buyers with whom we did most of our business were gradually changing to bulk handling of their flour shipments, and bulk tank cars and big bulk trucks, and it saved a lot of money in packing at the mill end and unpacking at the bakery end by just rolling a tank car of flour there and it unloaded pneumatically into a big bin or silo or whatever...all done in a few minutes time without any labor involved at all."

The Fisher-Fallgatter Milling Co. gradually lost customers because of a change in transportation technology. Fallgatter claimed that it would have cost him two or three times as much as the mill was worth to put in a bulk loading, handling and storage system.

Another factor that contributed to the mill's closing involved the employees. Over the years, Fallgatter usually employed three men; one to run the mill, one to pack flour into sacks and one to load and unload railroad cars and trucks. The employees were usually hired to work six eleven-hour days a week, and they

C. Snook

29. Don Fallgatter in 1979.



J. Lowe

30. West side of mill facing Oborn Street.

frequently worked overtime. Yet in later years, Fallgatter found that it was harder to find competent employees who were willing to work long days at the mill. Fallgatter felt that, "I was getting to the point where I was doing more work and the rest of the crew was doing less work, and the help situation was deteriorating."

Finally, in April and May of 1969, Fallgatter made his last carload shipments and sold his last sack of flour to a former employee, a baker in the neighboring town of Weyauwega. When he shut down the milling operation for the last time, there were just six other flour mills still operating in Wisconsin.[65] The Fisher and Fallgatter Mill was the last completely water-powered flour mill to close in the state.[66]

CONCLUSION

After Fallgatter closed the mill in 1969, all machinery was left in place and the building was rented out for storage until a sale could be made. Fallgatter sold the mill's waterpower rights which had been granted to the original owners in an act of the state legislature. The dam broke and the millpond became marshland. Fortunately, little other damage was done, and when Robert and Marjorie Paske purchased the mill in 1978, the mill structure and its contents had changed very little. Some milling equipment was missing and the old feed warehouse at the north end of the flour mill had been torn down for lumber.

The Paskes recognized the historic value of the mill, and with their initiation, the Fisher-Fallgatter Mill was placed on

the National Register of Historic Places in 1979, the first structure in Waupaca County to achieve that distinction. During the summer of 1979, the Paskes opened the mill as a museum; the mill is not operating, but visitors can see the equipment and machinery, and get an idea of how a waterpowered flour mill operated.

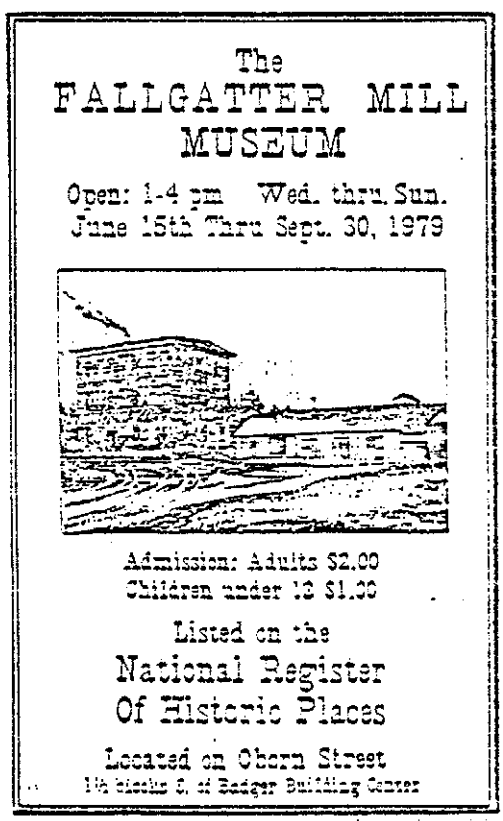
The mill remains in sound structural condition. Inside, mazes of original wooden chutes, spouting and elevators bring one back to Oliver Evans and the milling industry of more than a century ago. The iron turbine is visible below the basement floor, and above it stands the huge, wooden-cogged core wheel that transferred the turbine's power to the mill machinery. A variety of late nineteenth and early twentieth century machines stand intact. They once manufactured up to 330 bushels of grain into flour per day.

Outside, the mill's exterior paint has faded, faintly revealing the names "Roberts and Oborn" under the newer "Fisher and Fallgatter" lettering. The elevator and two warehouses at the south end of the mill stand in good condition. A massive, old millstone can be seen in the crawlspace under the southernmost warehouse; it was probably used in the old feedmill that Roberts and Oborn bought in 1884.

The Fisher-Fallgatter Mill stands as one of the few surviving flour mills in Wisconsin. Less than a century ago, hundreds of flour and gristmills were scattered across the state, as settlers found Wisconsin's soil ideal for wheat raising, and the state's

numerous rivers and streams offered ample waterpower. Flour mills played a vital part in the settlement and growth of Wisconsin, yet most have vanished; the falling off of the cultivation of wheat in the state and new milling techniques that led to the growth of large commercial flour mills contributed to the decline of decentralized technology that supported small community life. The Fisher-Fallgatter Mill in Waupaca lasted longer than most of these small Wisconsin mills. Don Fallgatter specialized in the production of rye flour and concentrated on bulk shipments to urban markets. Eventually, Fisher-Fallgatter was also unable to afford the costs of a centralized technological system.

Every remaining flour mill in Wisconsin is a significant document of the state's settlement and industrial past. Yet the relatively unchanged condition of the Fisher-Fallgatter Mill and its equipment, and its 85 years of continuous flour milling operation, make the mill an especially meaningful historic site.

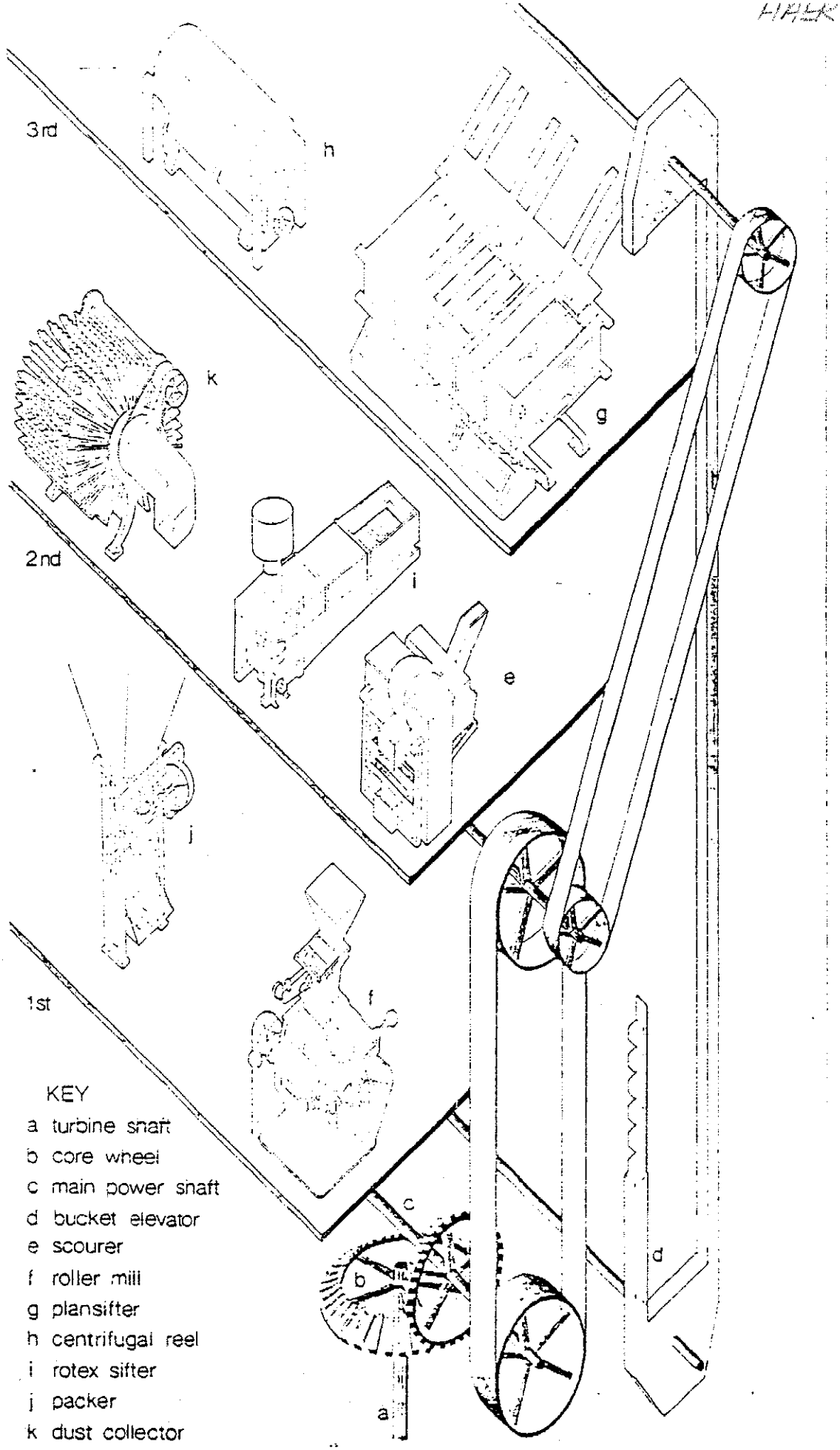


31.

MACHINERY

AND

EQUIPMENT



KEY
a turbine shaft
b core wheel
c main power shaft
d bucket elevator
e scourer
f roller mill
g plansifter
h centrifugal reel
i rotex sifter
j packer
k dust collector

32. Schematic drawing of machinery by floor.

G. Ebben

BASEMENT

Core Wheel
(directly above
turbine)

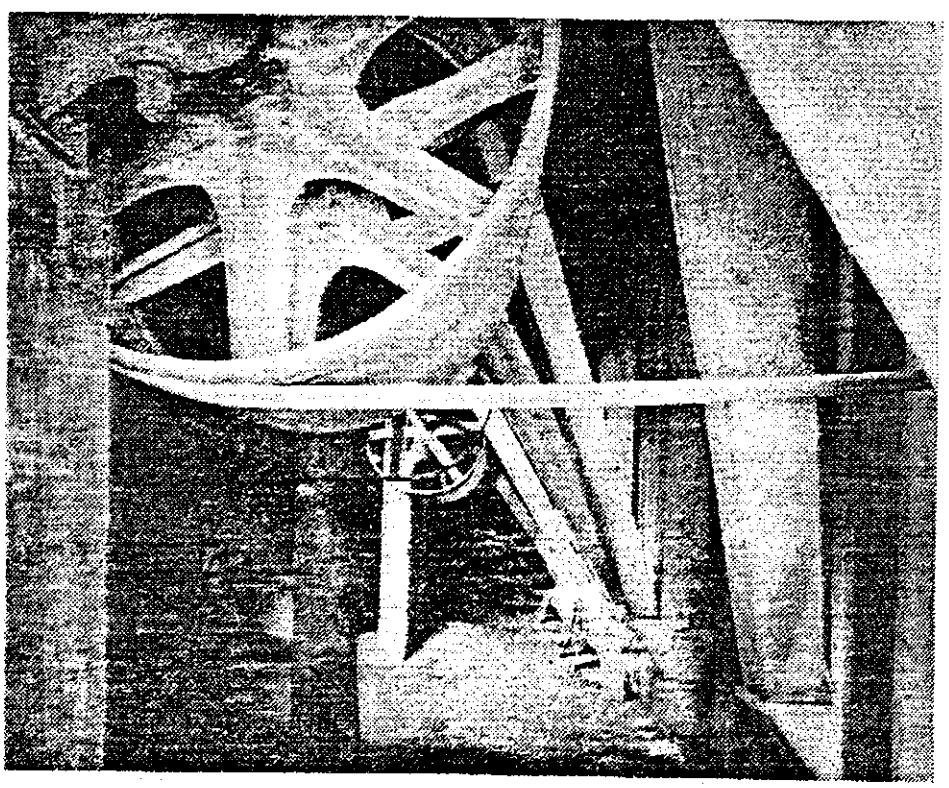
←N

STAIRS

flume
below
basement

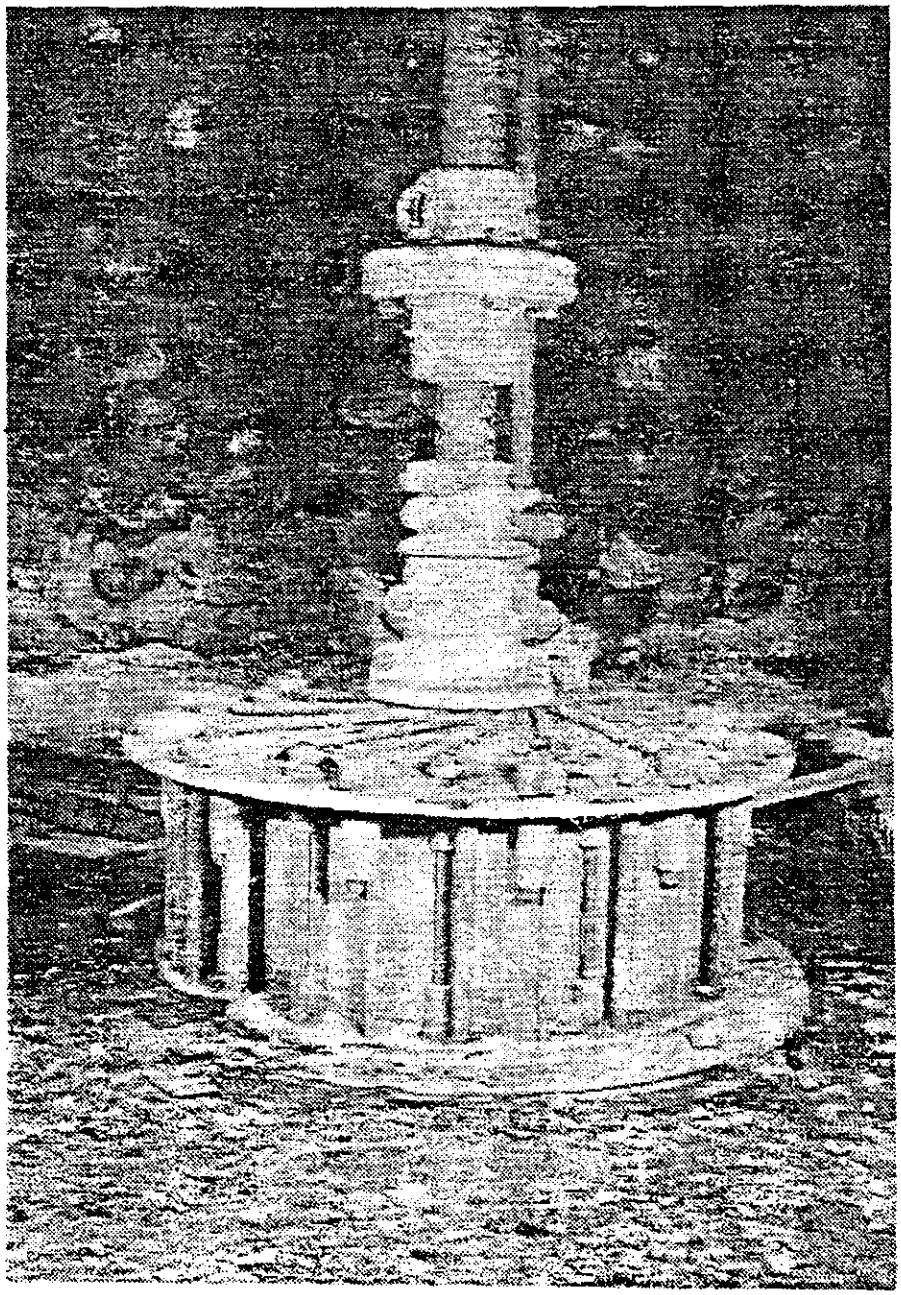
(Labels represent approximate locations.)

33. FLOOR PLAN



J. Lowe
34. View of main power shaft from core wheel

Samson Horizontal Turbine
35" Diameter
James Leffel & Co.
Springfield, Illinois



J. Vogel

35.

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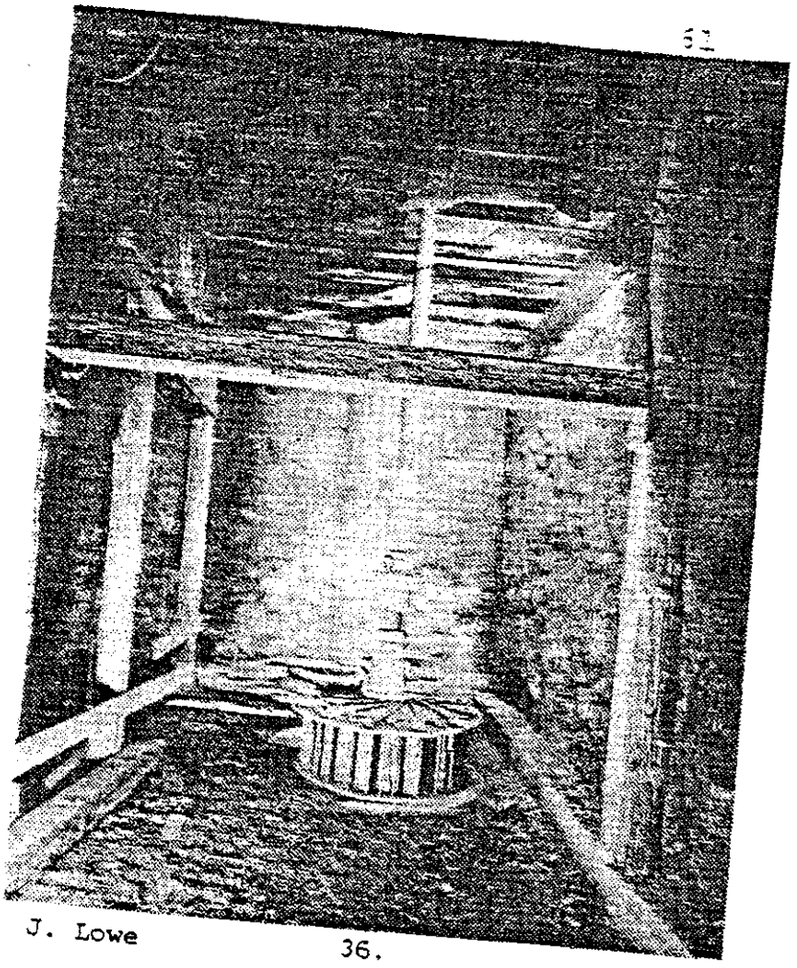
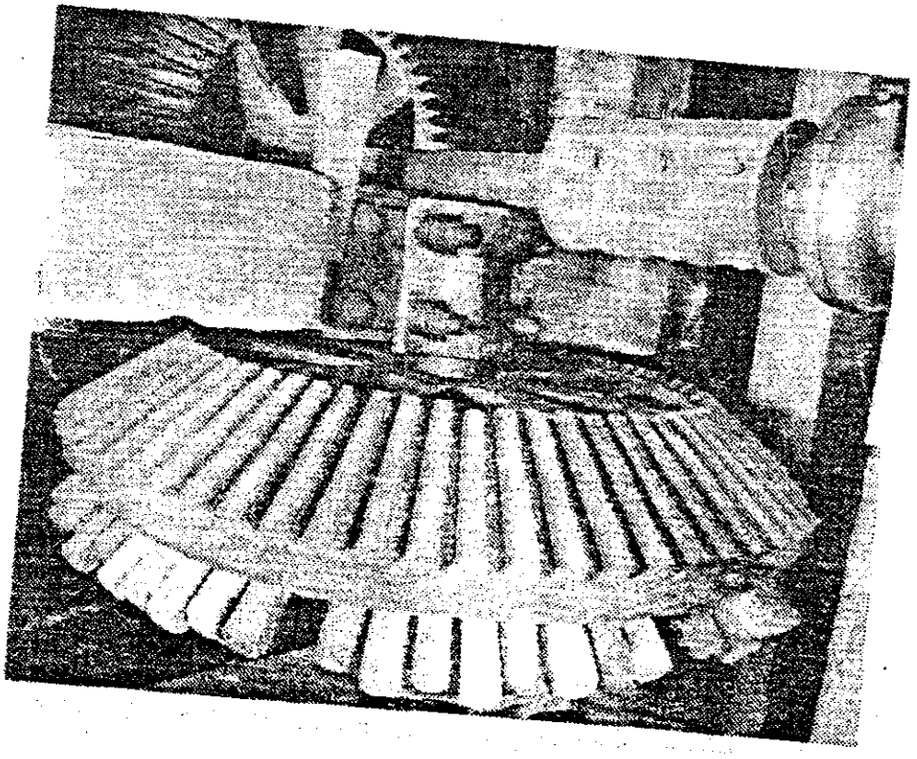


J. Lowe 36.

The Leffel turbine rests on a wooden floor in a 9' x 40' x 15' rubble stone wheel pit. The wheel pit, below the north end of the basement, held the fourteen foot head of water that powered the turbine. Water was conveyed to the wheel pit by a flume, and forced to pass through the turbine in order to leave the pit. The force of the water passing through the turbine's vanes rotated the runner wheel and the shaft that rose from the turbine to the floor above. Water flowed out of the turbine (below the wood support floor) and exited through a concrete tailrace to reenter the river. The turbine operated at approximately two-thirds of its capacity in providing the mill with the ninety horsepower that it required to operate smoothly.

Core Wheel



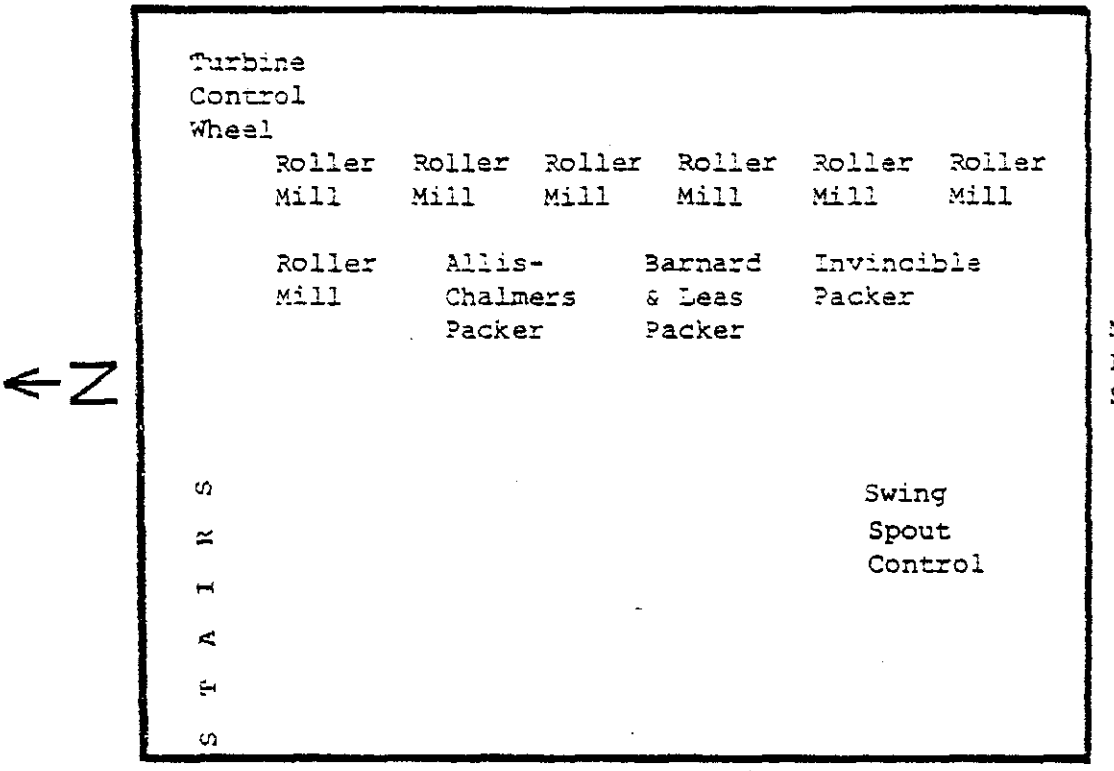
The gear teeth and the wedges below the (which hold the teet in place) are all ma of wood. Wooden gear were much quieter th metal ones when in operation.

J. Lowe 38.

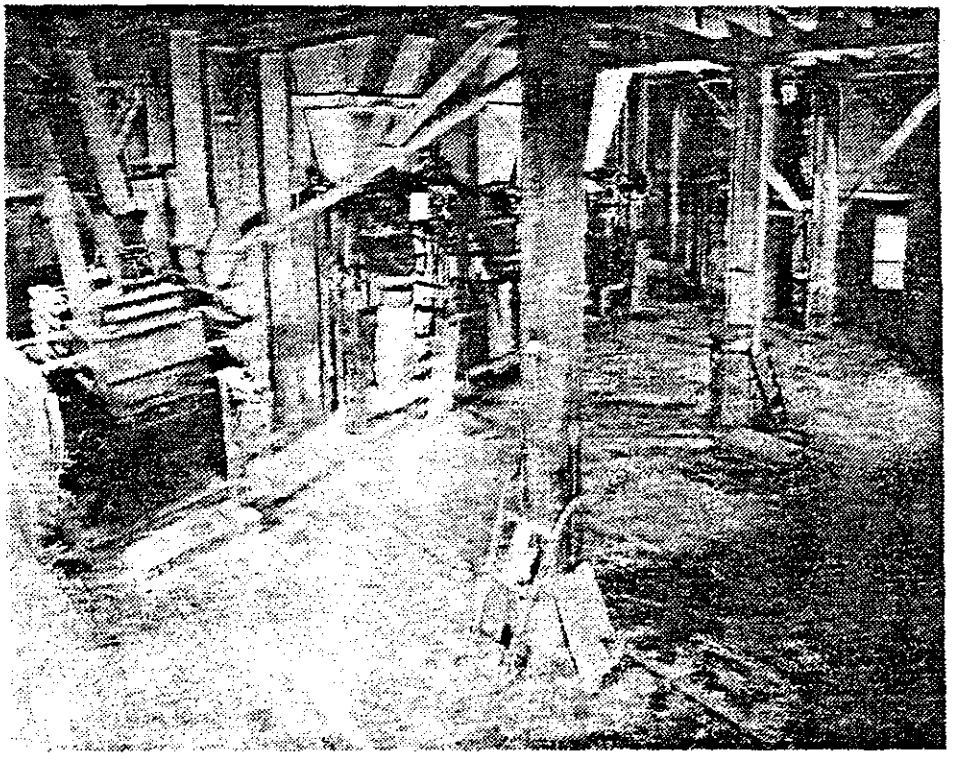
A forty-eight inch diameter horizontal core wheel with sixty-eight wooden gears is attached to the end of the vertical turbine shaft. The core wheel is bevel-geared to a smaller vertical wooden wheel, which received the turbine's power and drove the main power shaft that is attached to it at the center. The horizontal main power shaft transferred the turbine's energy to all of the mill operations.

A wooden drop toilet is situated behind the stairs at the north end of the basement; it emptied into the flume water as it flowed under the mill.

FIRST FLOOR



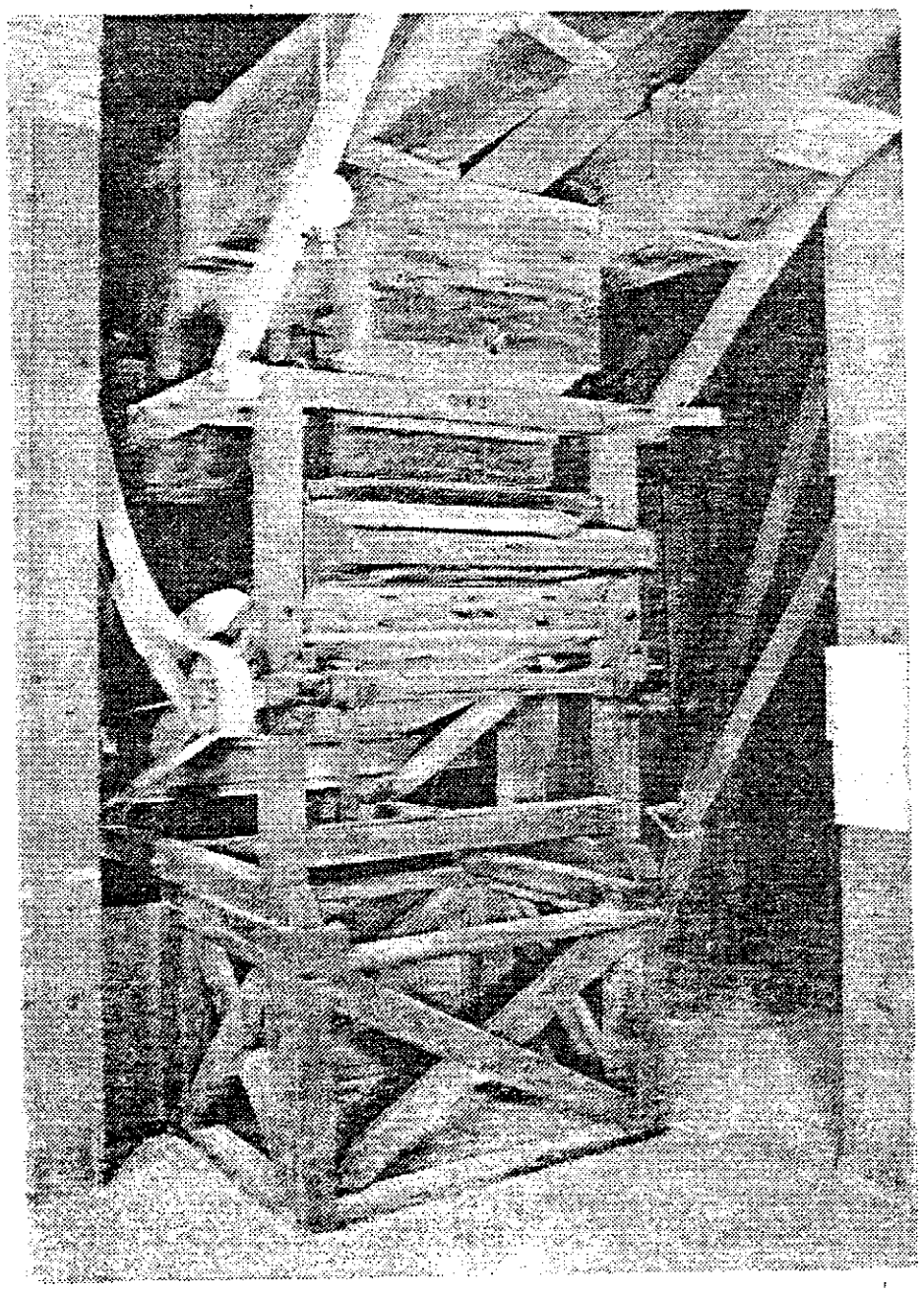
39. FLOOR PLAN



J. Lowe

40. View from stairway

Monitor Dustless Receiving Separator #542
Huntly, Cranson and Hammond
Silver Creek, New York
600 RPM
Capacity: 300 barrels per hour



J. Vogel 41.

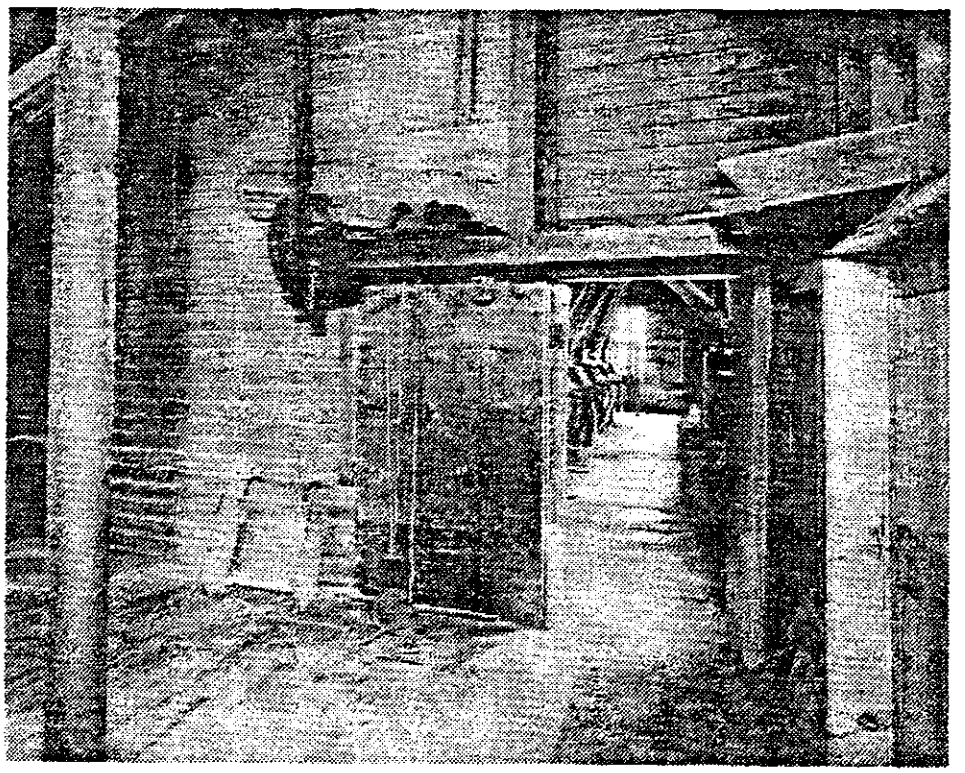
Grain was delivered to the mill into a chute on either the street side or railroad track side of the mill. It fell down the chute into the basement, where it was immediately elevated in the buckets of the receiving elevator to the receiving separator. In this machine, grain went through a preliminary cleaning to remove coarse dirt, straw, and other impurities. The rye was sifted through a number of oscillating sieves, and air currents carried off light material. After the preliminary cleaning, the grain fell into a hoppered scale immediately behind the separator for weighing, then fell through the bottom of the hopper into the basement. Here, the buckets of the main grain elevator picked the grain up and carried it to the third floor swing spout for distribution.

Swing Spout Control

The miller directed the grain that was elevated to the third floor swing spout into whatever bin he chose by operating the control on the first floor. Usually, he directed the grain into chutes that guided it to one of the four grain bins in the elevator at the south end of the mill.

Power Shovel

Clutch friction brake

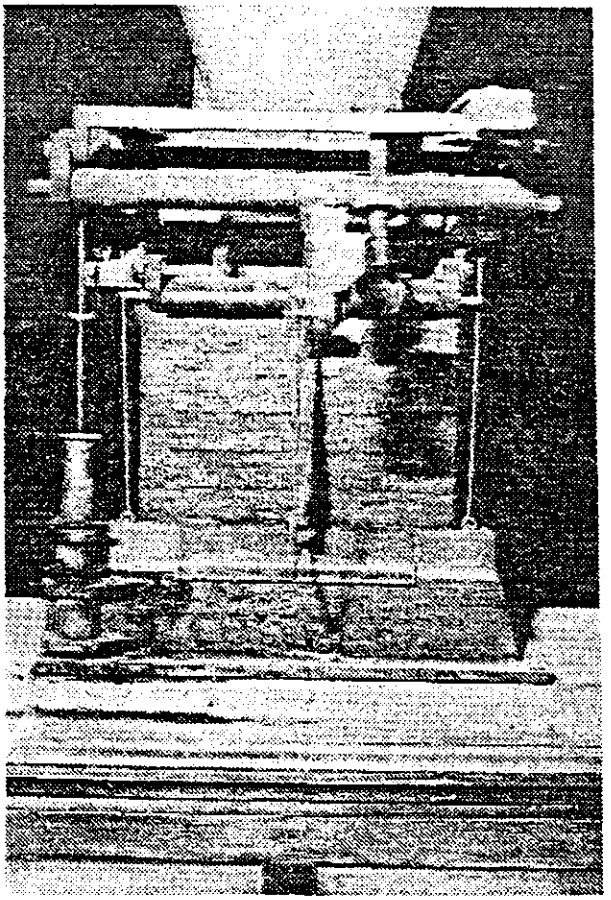


J. Lowe

42.

Used to unload grain from railroad cars into the grain chute. In above photo, the power shovel is on the floor to the left of the doorway. The roller mill assembly is visible in the background.

Columbian Feed Governor
Columbian Feed Governor Corporation
Minneapolis, Minnesota
Patented July 4, 1911; No. 997,048
25 bushel capacity



J. Vogel 43.

All fully-cleaned grain fell from a bin on the second floor into the Columbian Feed Governor, which controlled the rate of grain flow into the first break roll immediately beneath it. This feeder regulated the movement of stock through the entire mill.

Roller Mills

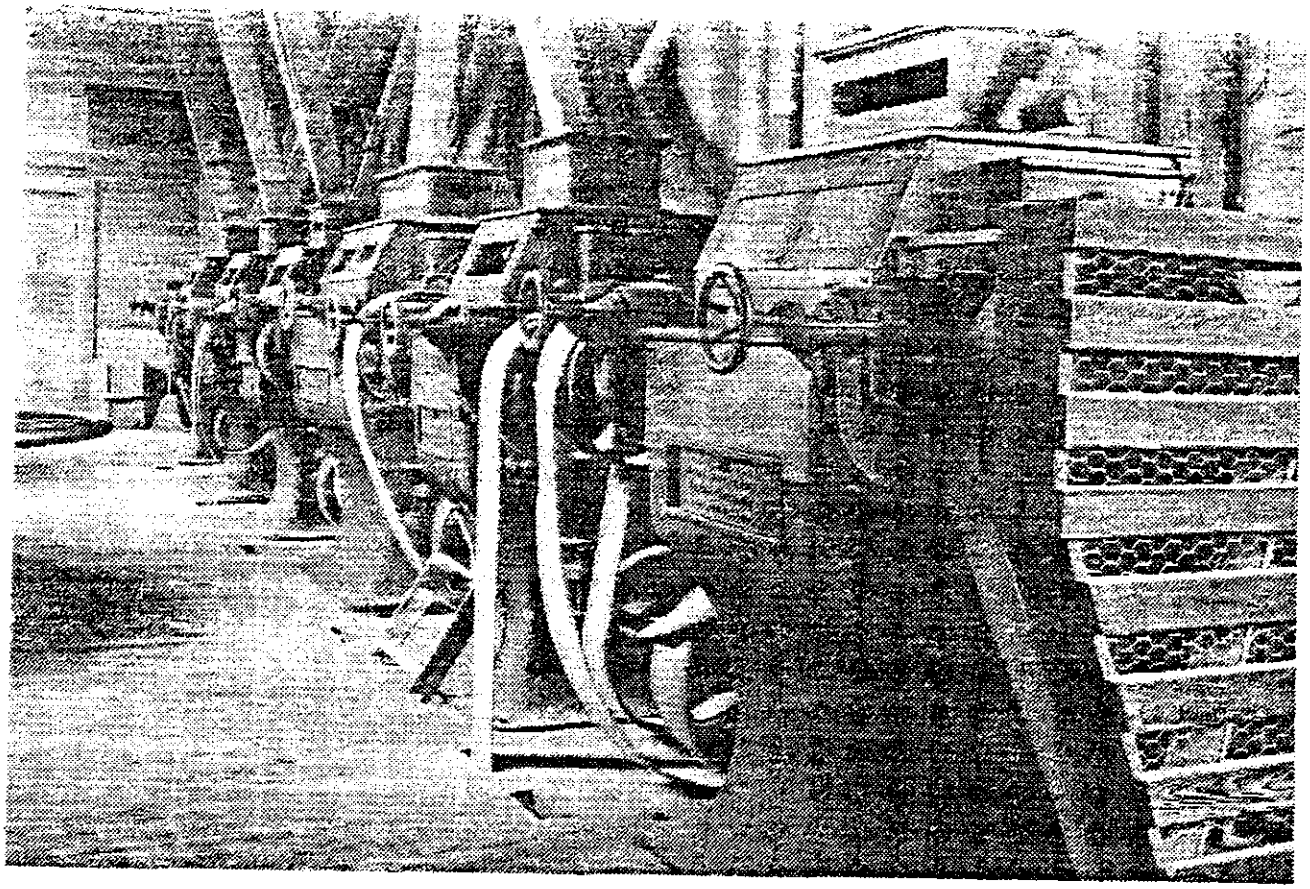
The seven roller mills each contain two separate sets of rollers. There are:

5 Break rolls
6 Middlings rolls
1 Sizing roll
1 Tailings roll
1 Pumpernickle roll

First break roller stand-
Barnard & Leas Mfg. Co. (?)
Moline, Illinois

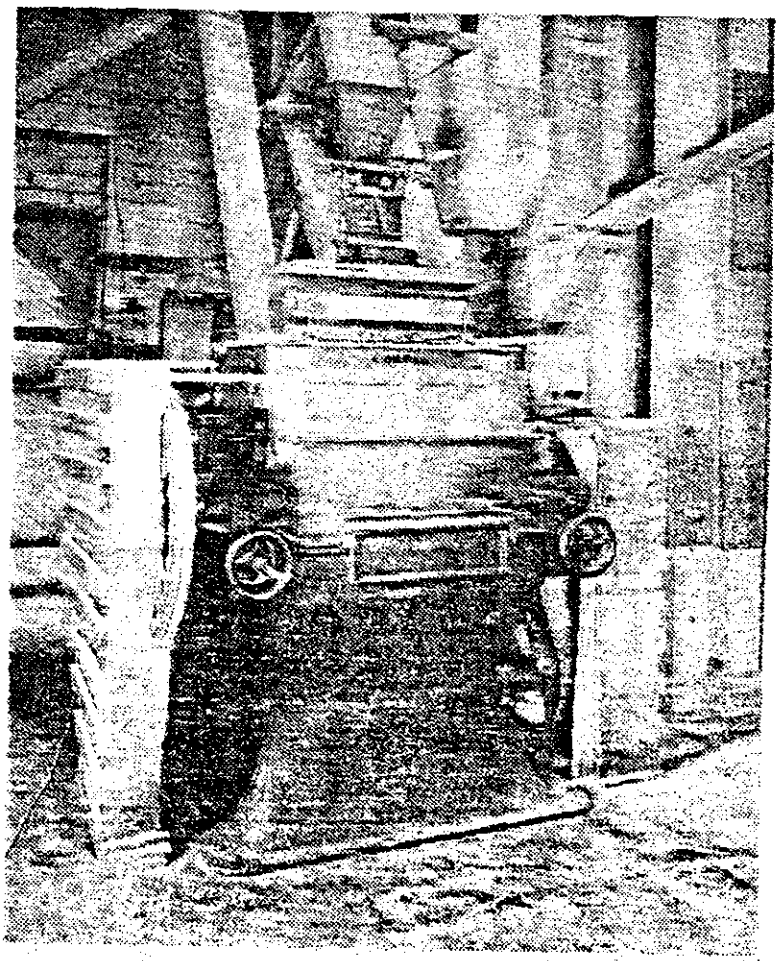
Other six roller stands-
Allis Chalmers Co.
Milwaukee, Wisconsin

The corrugated rolls have 18 to 30 corrugations per inch of circumference.



J. Vogel

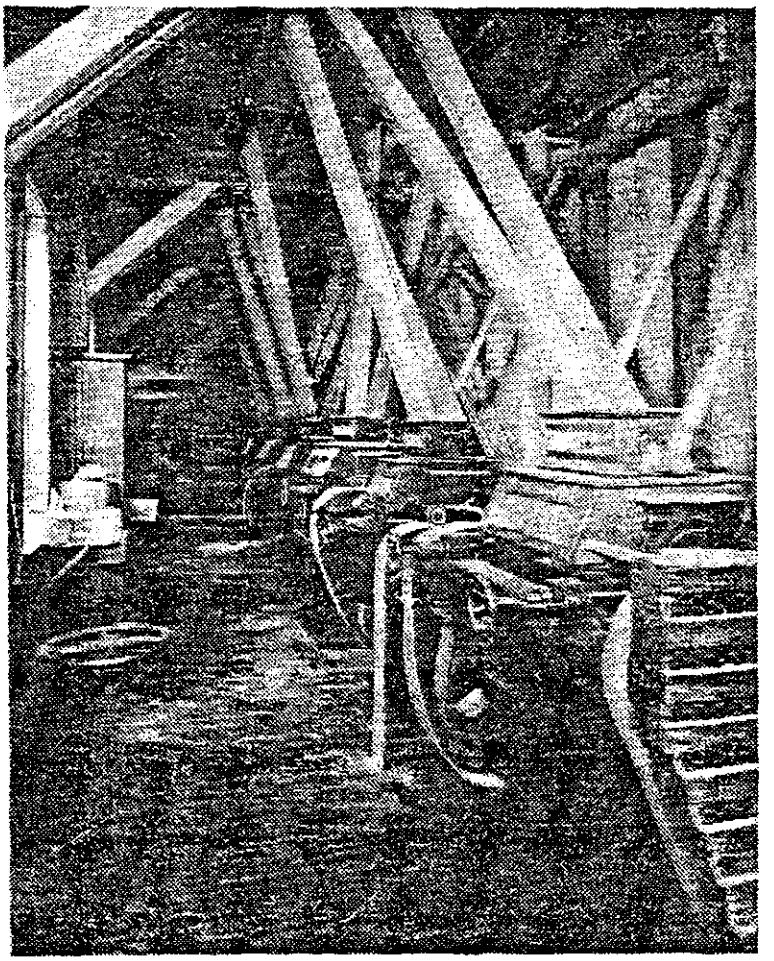
Second (in foreground) through seventh roller mills.



First break roller mill.

Each of the roller mills is partitioned in the middle, with a pair of rollers on each side. The rollers have lengthwise grooves and revolve against one another, one moving faster than the other. All rye passed through the pair of "first break" rolls for its first grinding; the wide corrugations on these rolls split the grain kernels open without crushing them, thereby producing middlings that could be gradually reduced to flour and by-products. The ground stock then fell into the basement to be elevated to the sieves of the plansifter for grading. Any material not sifted out as flour came back down to the rollers (depending on the size of the different grades of material) for regrinding. Each pair of rollers carried the separation of the flour from the bran one step further; grinding and sifting continued until only finished flour and by-products remained. The first break roll was purchased from a mill in nearby Weyauwega.

Turbine Control



By turning the control wheel (at left foreground), the miller could open or close the guide vanes on the turbine, changing its speed and therefore the speed of the entire milling process. Located near the control wheel was a speed indicator (no longer existing) which showed the miller when it was necessary to adjust the turbine's vanes. If the turbine was revolving much slower than normal, it usually meant that the millpond was getting low or that the trash rack at the mouth of the flume was clogged.

Packing Machines

Reliance Flour
Packer #2, Size 3

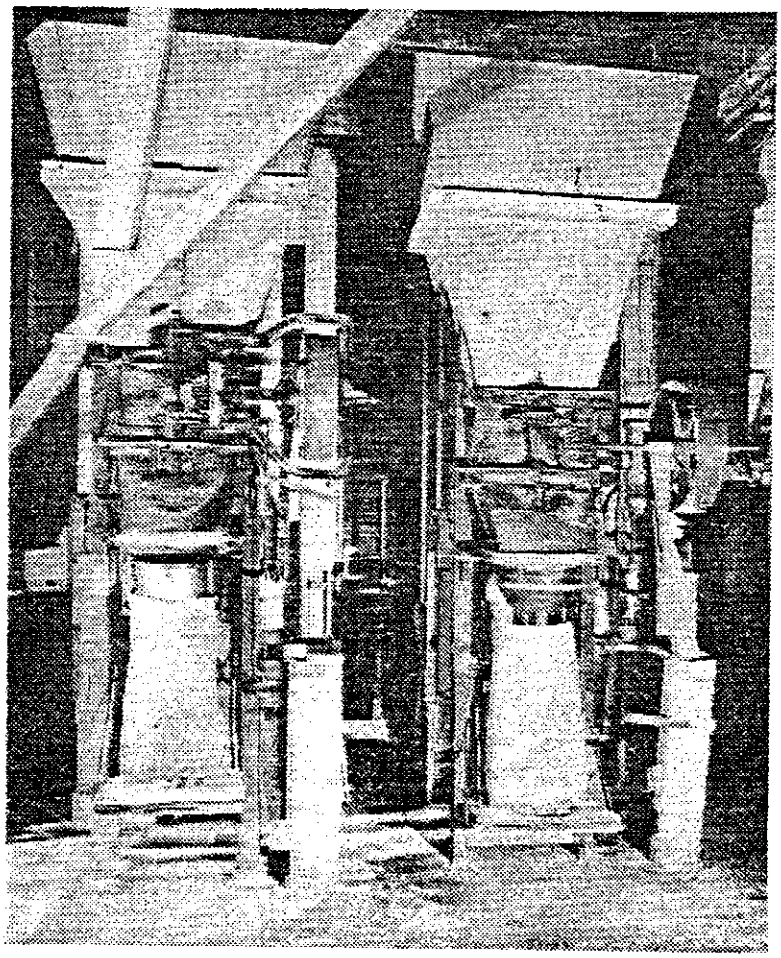
Allis Chalmers Co.
Milwaukee, Wisconsin
(packed dark flour)

Improved Eureka Drop Gear
Flour Packer

Barnard & Leas Mfg. Co.
Moline, Illinois
First Patent Date 7/30/1867
Last Patent Date 4/4/1882
(packed white and medium flour)

Invincible Drop Gear
Bran Packer #10980

Invincible Grain
Cleaner Co.
Silver Creek, New York
(packed rye middlings)

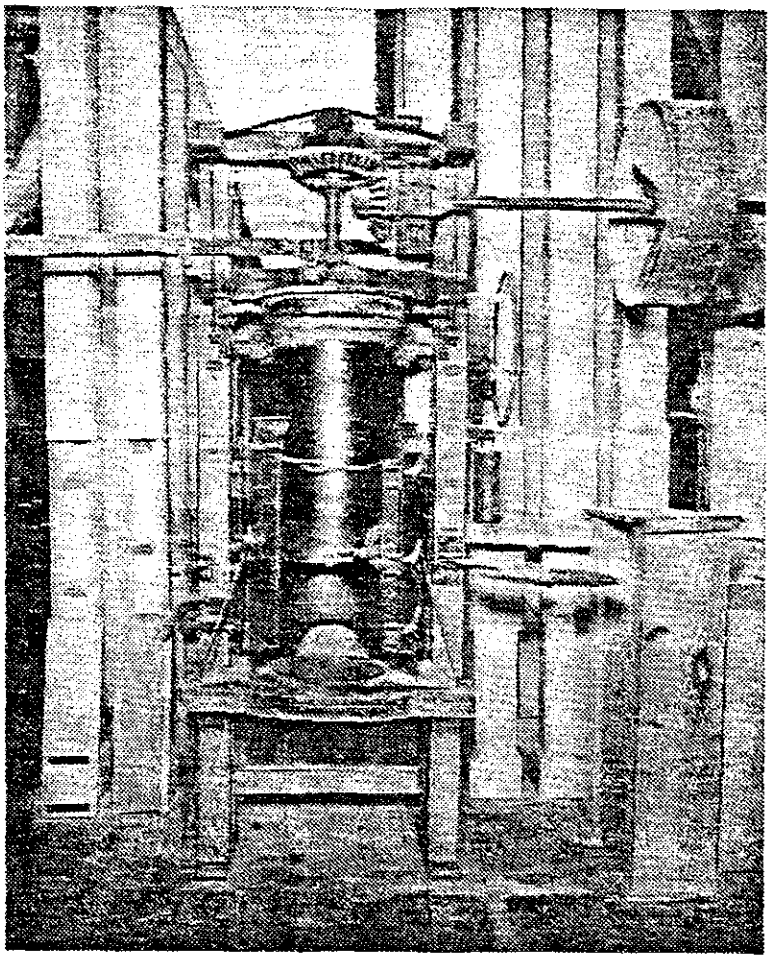


J.
Lowe

47.

Allis Chalmers
Flour Packer

Barnard & Leas
Flour Packer



Invincible

Bran

Packer

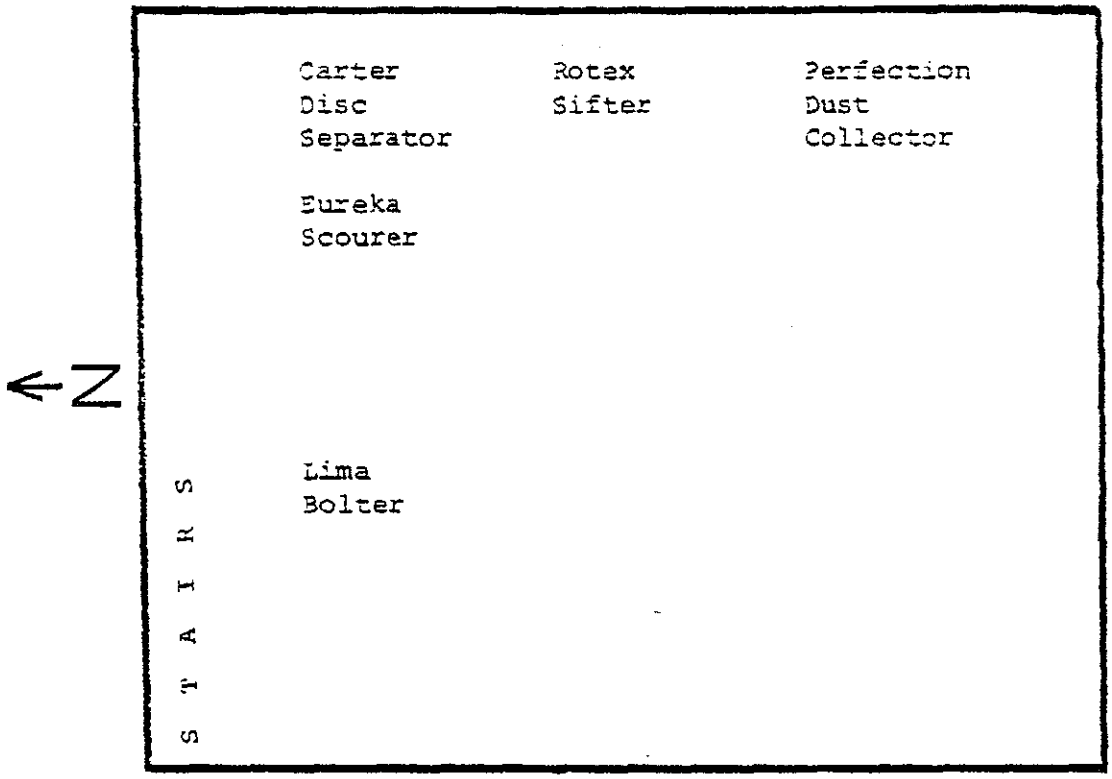
J. Lowe 48.

Any rye by-products or finished flour was conveyed to one of three separate bins above the three packers: dark flour went into the bin above the Allis Chalmers packer, white and medium flour went into the bin above the Barnard and Leas packer, and by-products went into the bin above the Invincible packer. Each packer received material from the bin above it and fed it through a nozzle into a sack, then automatically stopped when the sack reached a specific weight. An employee stood in front of the packer to check-weigh the sacks (on a Fairbanks platform scale) and then sew the top opening closed. This employee was usually able to pack the mill's daily capacity of flour (about 300 100-pound sacks) in several hours, so in his spare time he helped with such tasks as sweeping floors, oiling machines, and loading railroad cars.

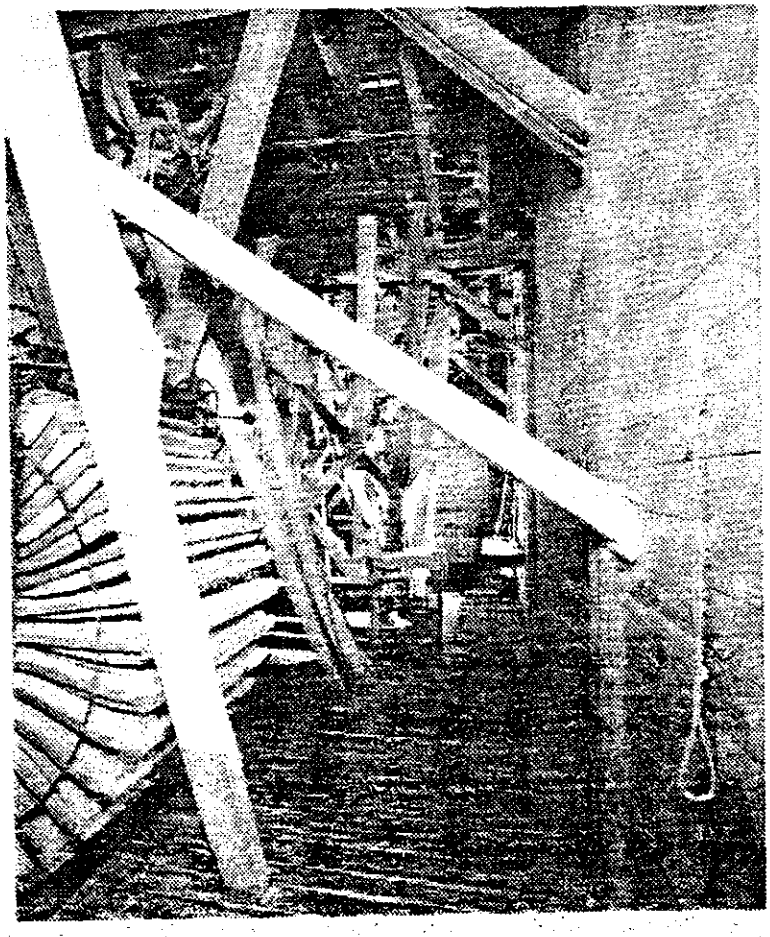
General Electric Generator
110 volt

Although the mill had a complete electric lighting system, this General Electric "lighting dynamo" was capable of generating electricity to power the lights by itself when the mill was in operation.

SECOND FLOOR

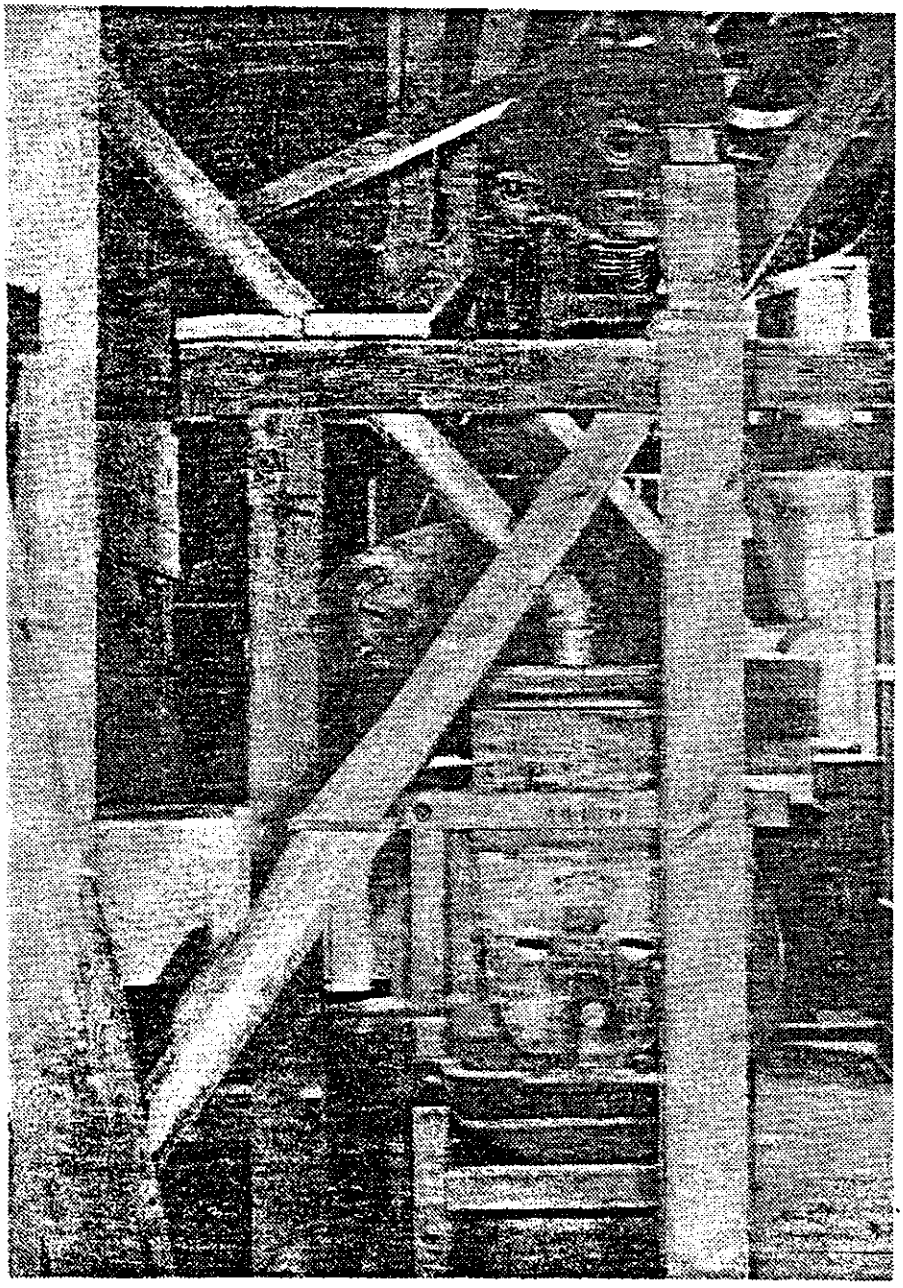


49. FLOOR PLAN



J. Lowe

Carter Disc Separator #151BAT (top of photo)
Junior Model, Serial No. 3193
Carter Mayhew Mfg. Co.
Minneapolis, Minnesota
80 RPM, 40 bushel capacity
First Patent Date 1/4/1921
Last Patent Date 2/20/1923

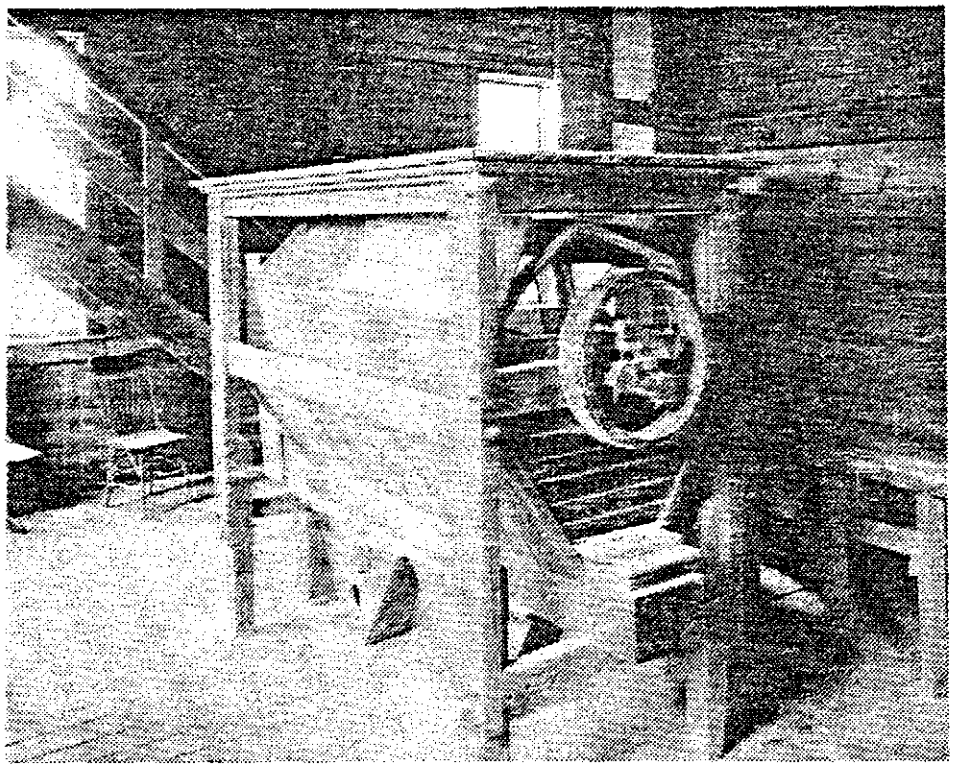


After leaving the separator on the third floor, partially cleaned grain fell into the Carter Disc Separator. This machine contains a set of vertical rotating discs covered with small pockets, that revolved in a trough of grain. The pockets picked up anything the size of a grain of rye or smaller, but rejected straw, oats, ergot (a black fungus that frequently contaminated the rye kernels), or anything else that was larger than the pockets. Vanes fitted to the spokes of the discs kept the grain moving in the trough. After the grain left the disc separator, it fell through a spout that contains a pair of horseshoe magnets. As the grain passed over them, the magnets caught any small pieces of metal that had been mixed with the grain.

J. Vogal 51.

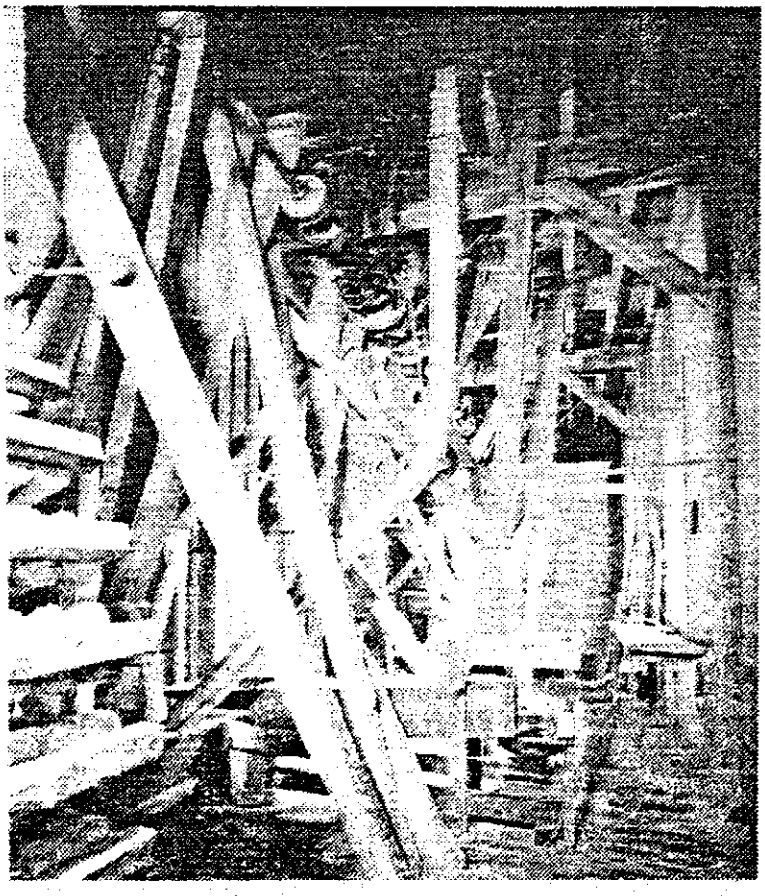
Eureka Horizontal Wheat Scourer #17 (bottom of photo)
#54165
S. Howes Co.
Silver Creek, New York
"Against the Sun" (rotates counter-clockwise)

Grain fell into the Eureka scourer after it had passed over the magnets in the spout above. The grain entered a drum lined with an abrasive surface, and pro - peller-like blades revolved on a shaft within the drum to beat the grain against this surface. Air currents carried away any material scoured off in the drum



J. Lowe 52.

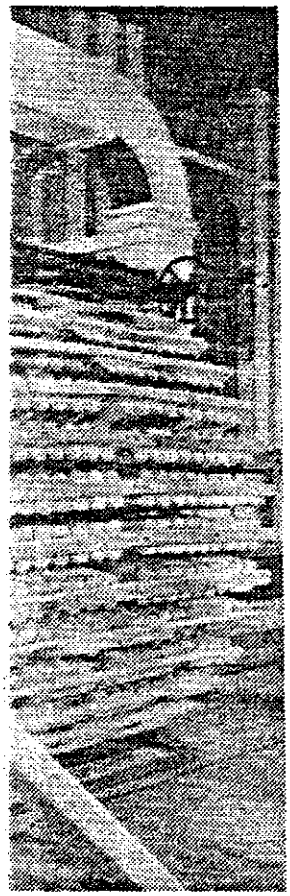
One of the few vestiges of the Fisher-Fallgatter feed mill operation (that was discontinued in 1943), this reel was used for bolting, or separating, cracked corn.

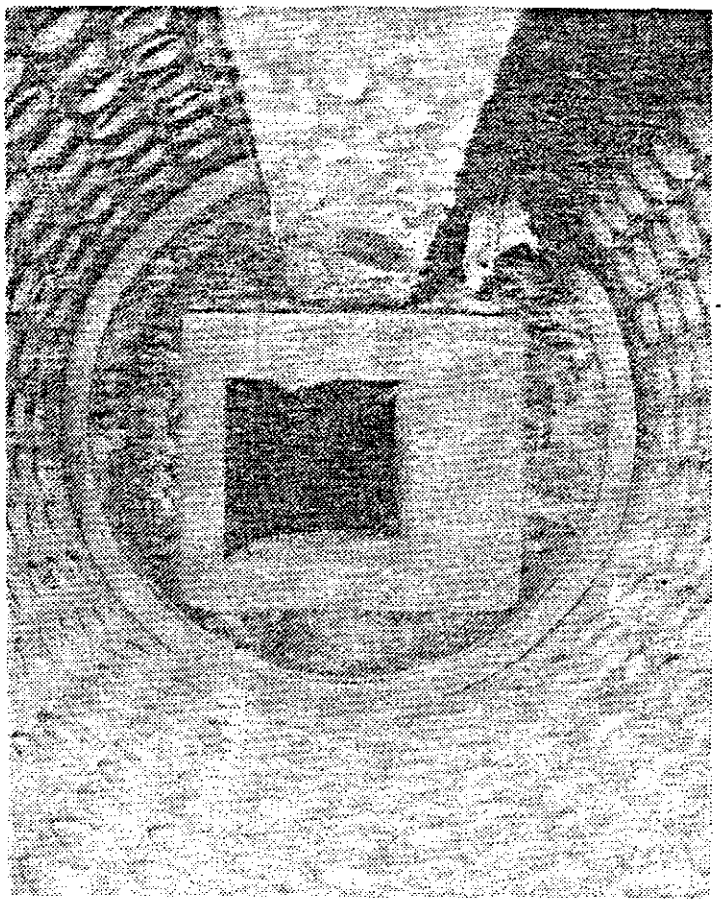


Simpson Rotex Sifter #76
Type B-1
Orville Simpson Co.
Cincinnati, Ohio
400-425 RPM

The Rotex sifter (on floor at center foreground) gave all flour a final sifting and mixing before it was conveyed to the bins above the packers A glass feeder (no longer existing) was attached to the machine which added a powder bleach compound to the flour as it entered the sifter. Bleach removed the slight color of the rye flour, but it was added only at the purchaser's request.

on Dust Collector #34
Rau Mfg. Co.
e, Wisconsin
tent Date 2/20/1883, #'s 272,473 & 272,474

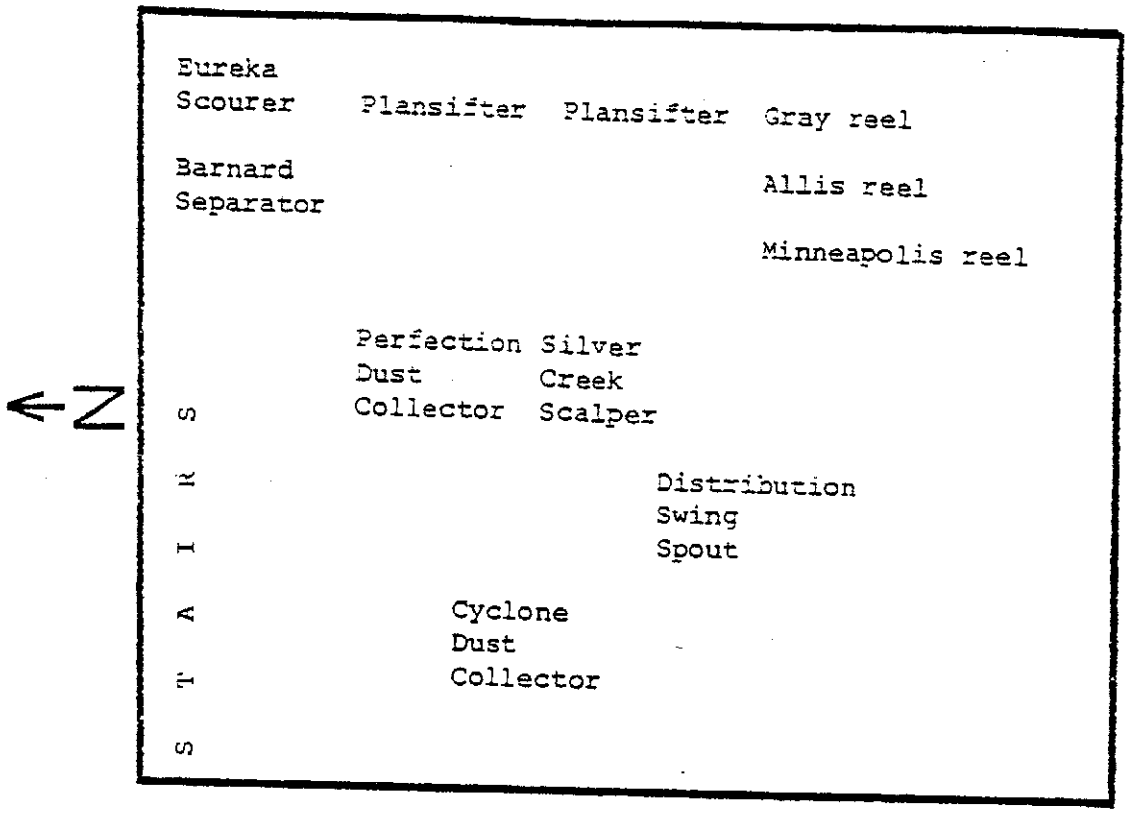




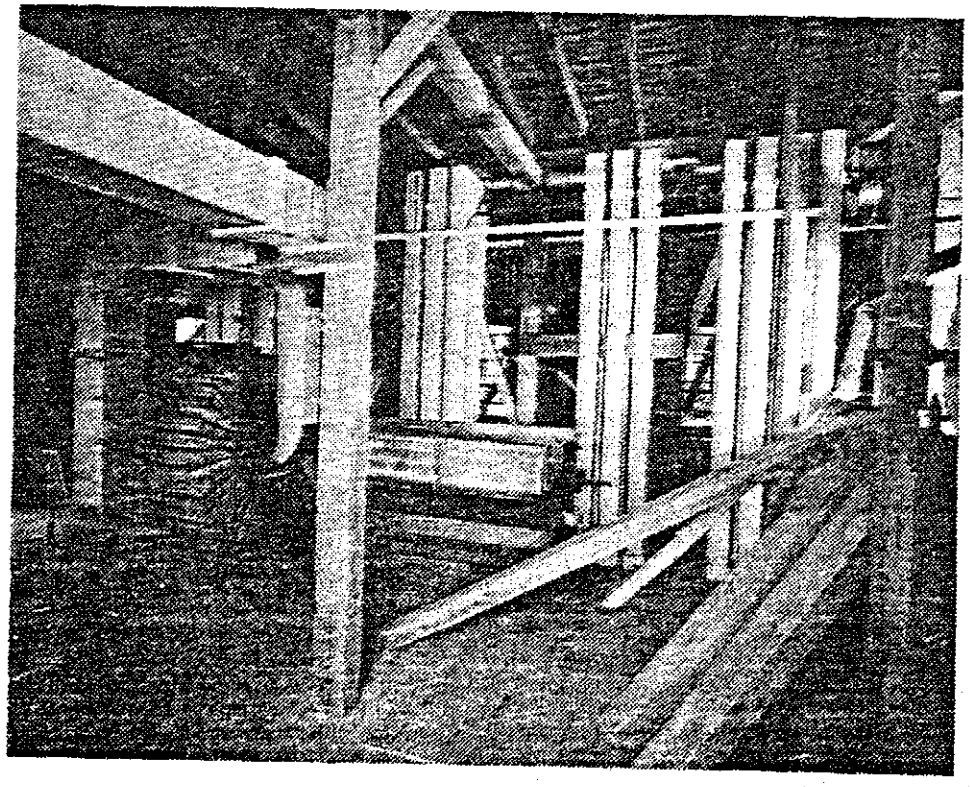
J. Vogel 55.

ioned off of the grinding rolls and the third floor stock
ed in exhaust trunks to this duct collector. The dust was
of the machine, and while air filtered through the cloth-
ist was trapped inside of them. The machine slowly revolved,
ockings was mechanically tapped as it came under a hammer at
ne. This released the dust (mostly flour dust) into a con-
the material to the plansifters for sifting.

THIRD FLOOR

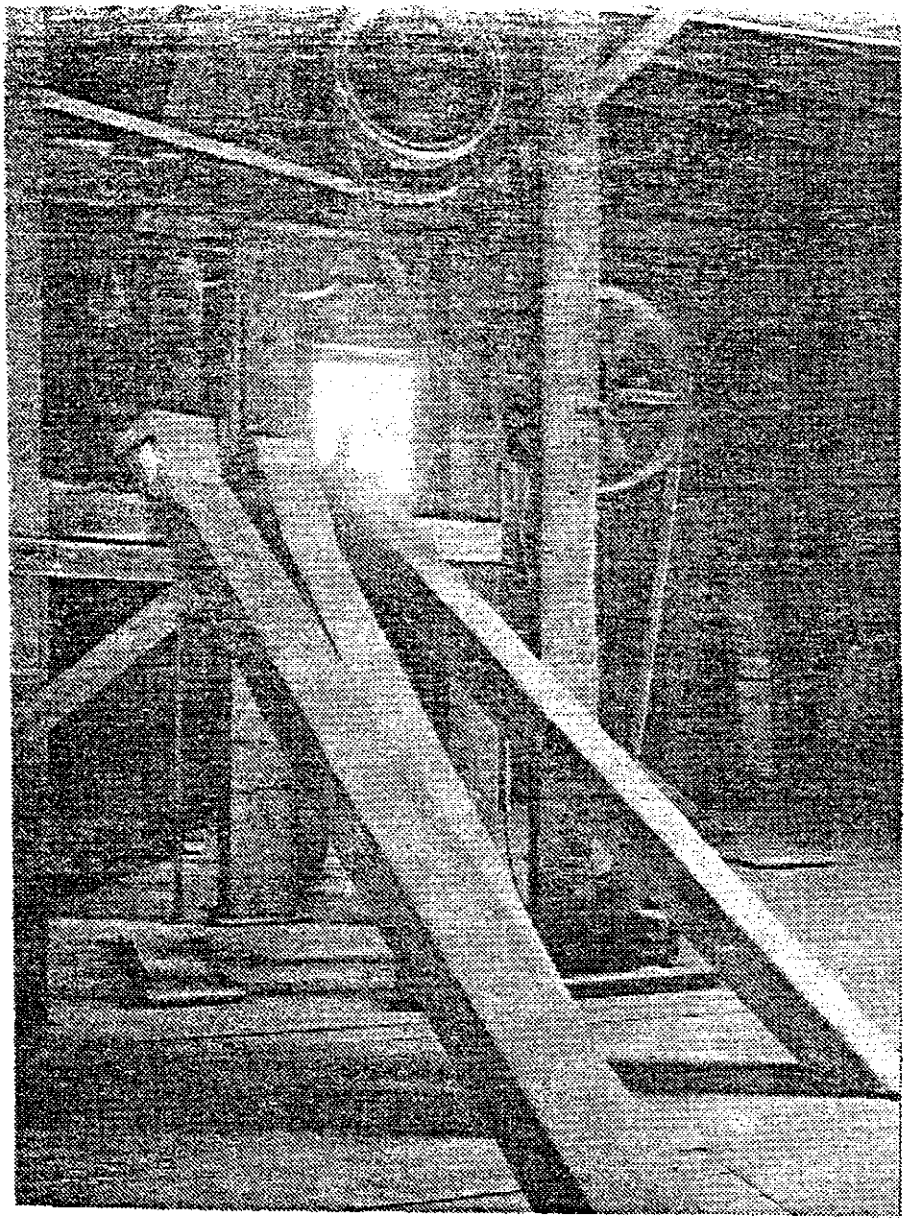


56. FLOOR PLAN



J. Lowe

57. View from southwest corner

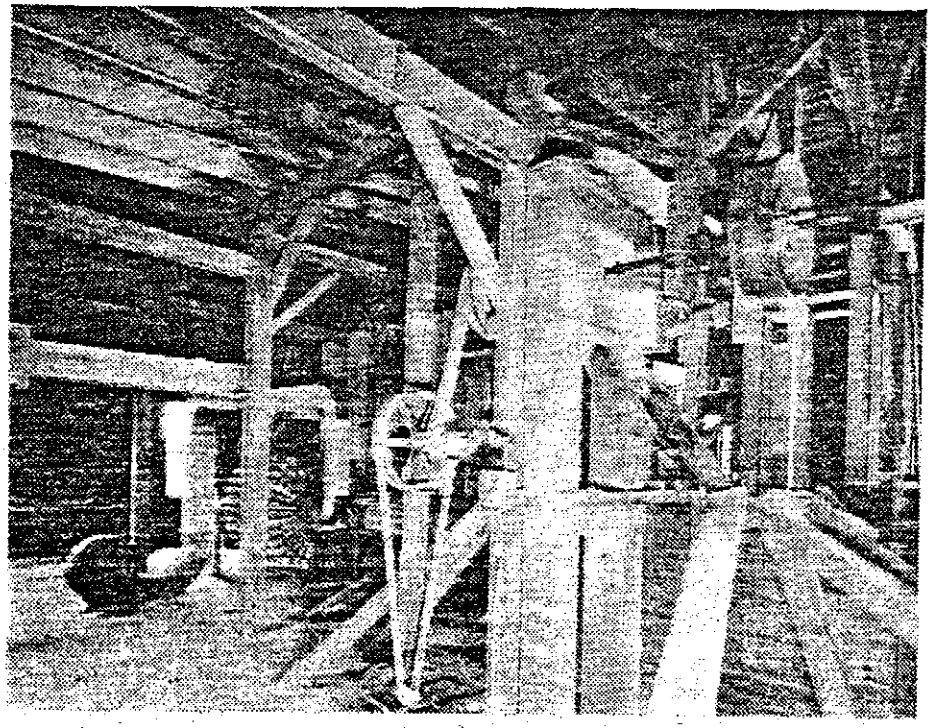


J. Vogel 58.

Distribution Swing Spout

After a preliminary cleaning in the receiving separator on the first floor, grain was elevated to this distribution spout in the buckets of the main grain elevator. From the first floor, the miller directed this spout so that the grain fell into one of several chutes that led to the grain bins.

The main grain elevator that carried grain up to the swing spout was usually belt-driven from a power shaft. However, if the miller wanted to move some grain at a time when the mill was not operating, he could remove the belt and power the elevator with a General Electric 30 h.p. motor located on the floor below the swing spout.



59

J.

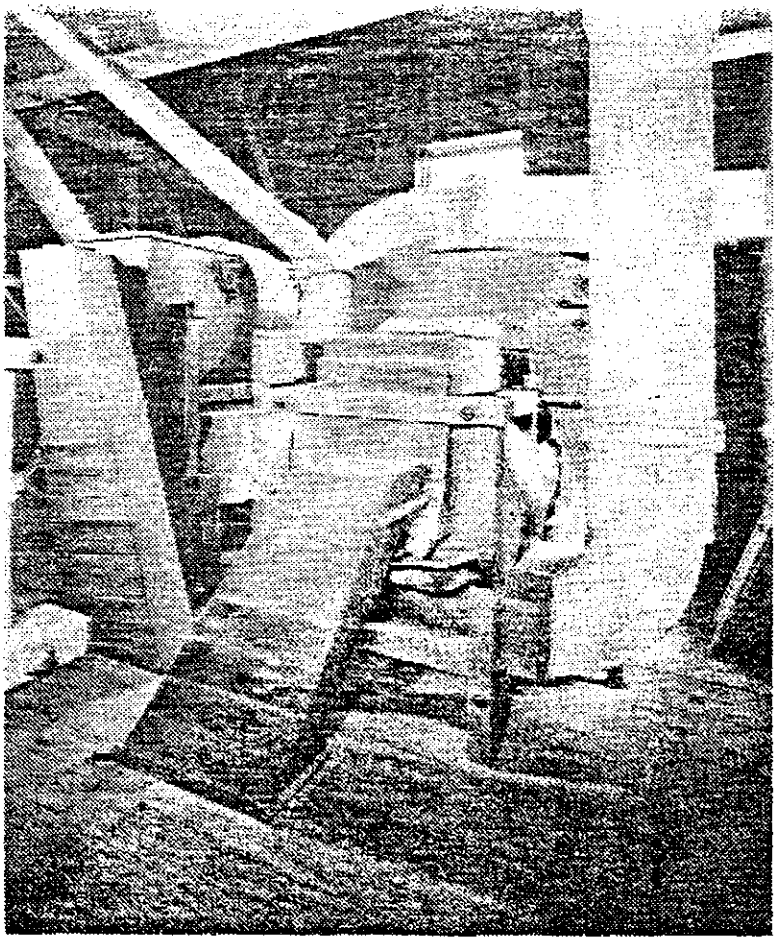
J. Lowe 60.

H.H. Barnard Dustless Wheat Separator and Oat and Weed Extractor #1
Barnard & Leas Mfg. Co.
Moline, Illinois
First Patent Date 6/27/1876
Last Patent Date 6/27/1882
40 bushel capacity

This separator gave the grain its first cleaning after it came out of the grain storage bins. The machine is very similar to the receiving separator on the first floor as it cleaned grain with oscillating sieves and air currents; however, the sieve cloths in this separator are finer to hold back very small particles of dirt and debris.

Silver Creek Elevator Scalper #
#388
August Heine Patentee and Manufacturer.
Silver Creek, New York
First Patent Date 10/11/1870
Last Patent Date 1/4/1887
28 RPM

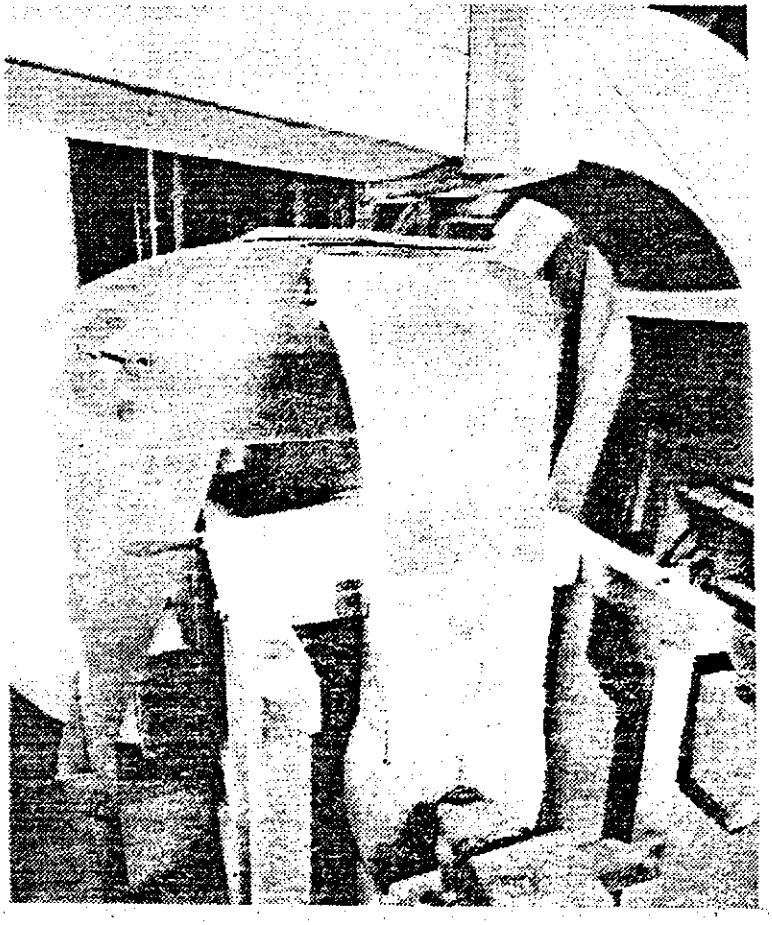
This reel resifted some of the lower grades of ground and sifted stock.



J. Lowe 62.

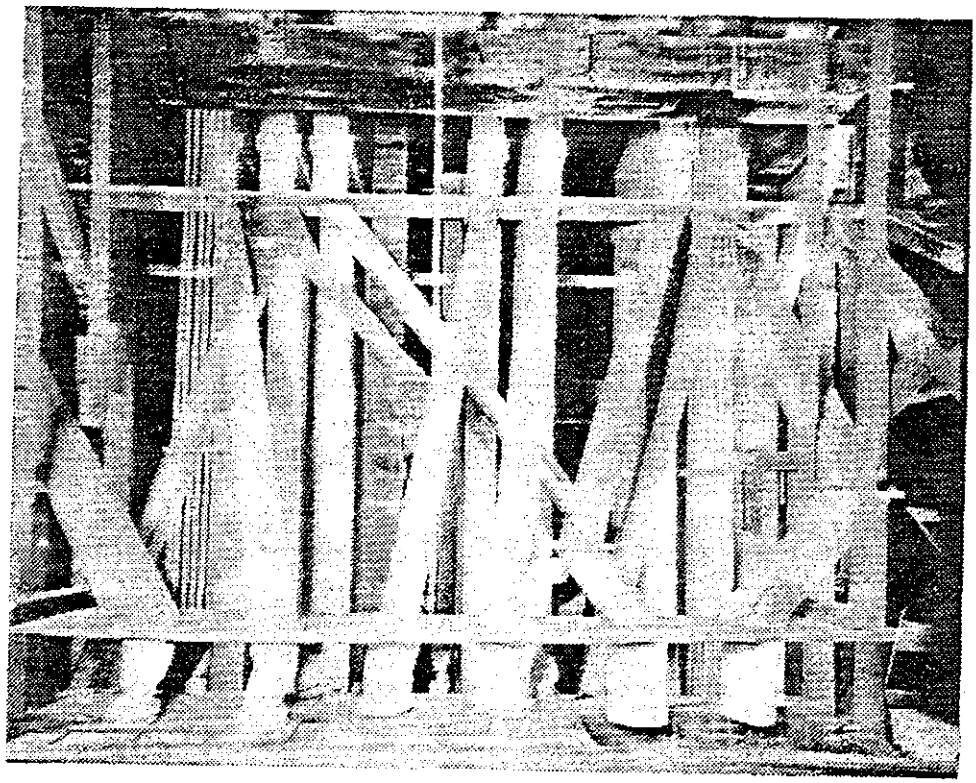
Eureka Horizontal
Wheat Scourer #18
#71505
S. Howes & Co.
Silver Creek, New York
"Against the Sun" (rotates counter-clockwise)

After leaving the Eureka Scourer on the second floor, the grain was elevated to this machine for a final cleaning before it was ground. This scourer operated in the same way as the scourer on the second floor.

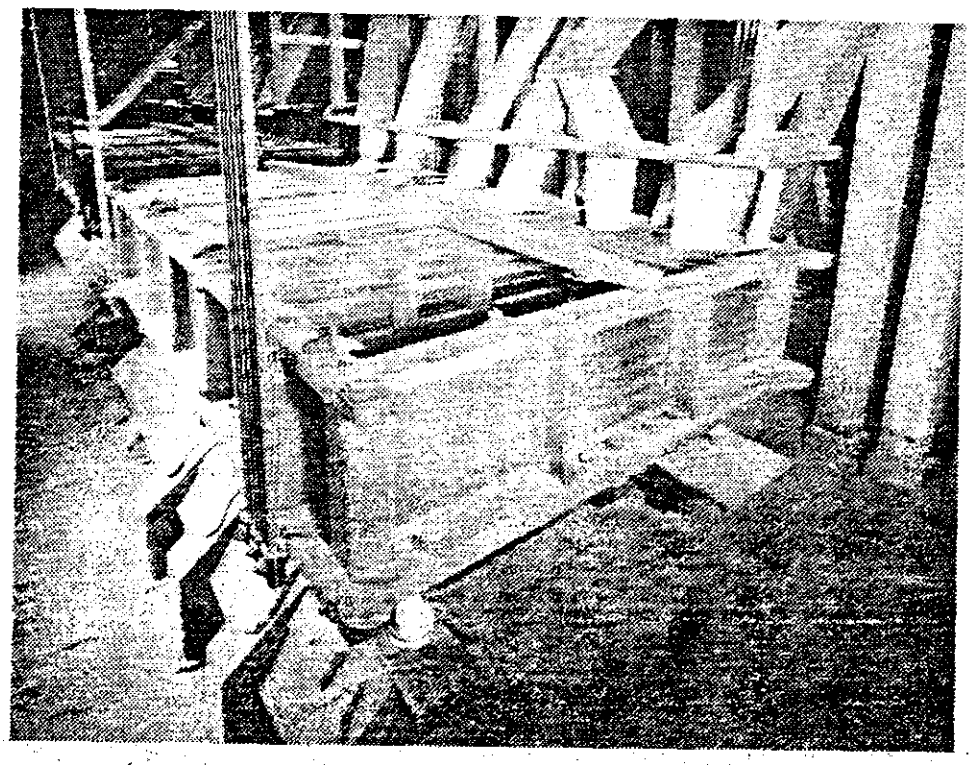


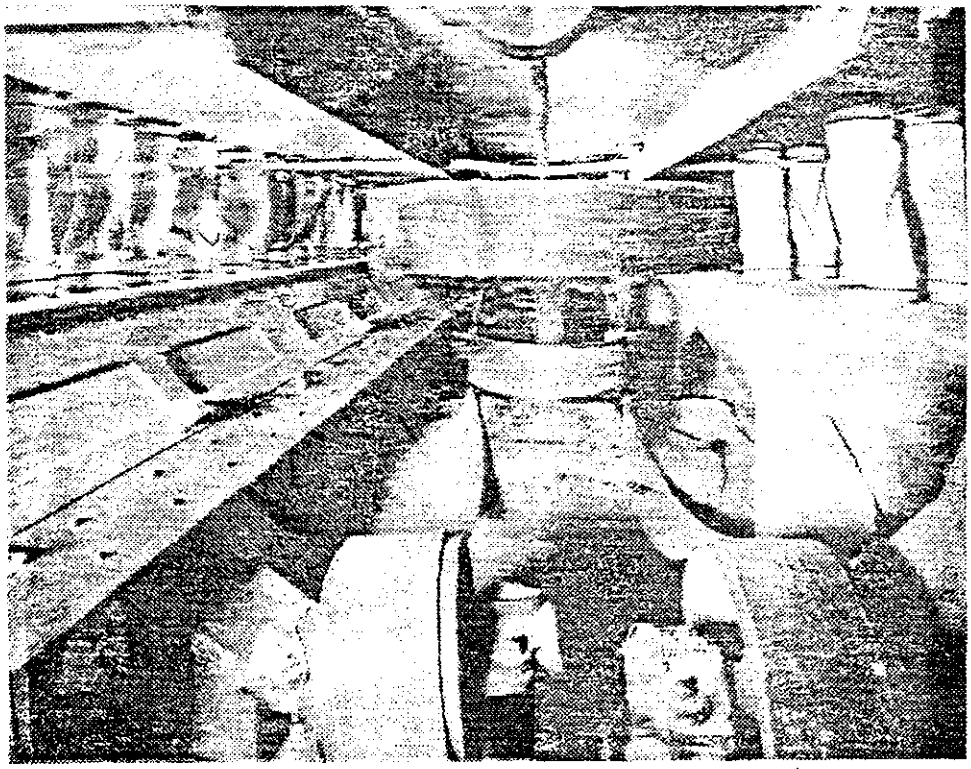
J.
Lowe

Plansifters, Size 2
Carl Haggenmacher, Inventor
Barnard & Leas
Moline, Illinois
Patented 5/27/1890
Reissued 6/28/1892



J. Lowe 64.





Driving Mechanism

J. Lowe 66.

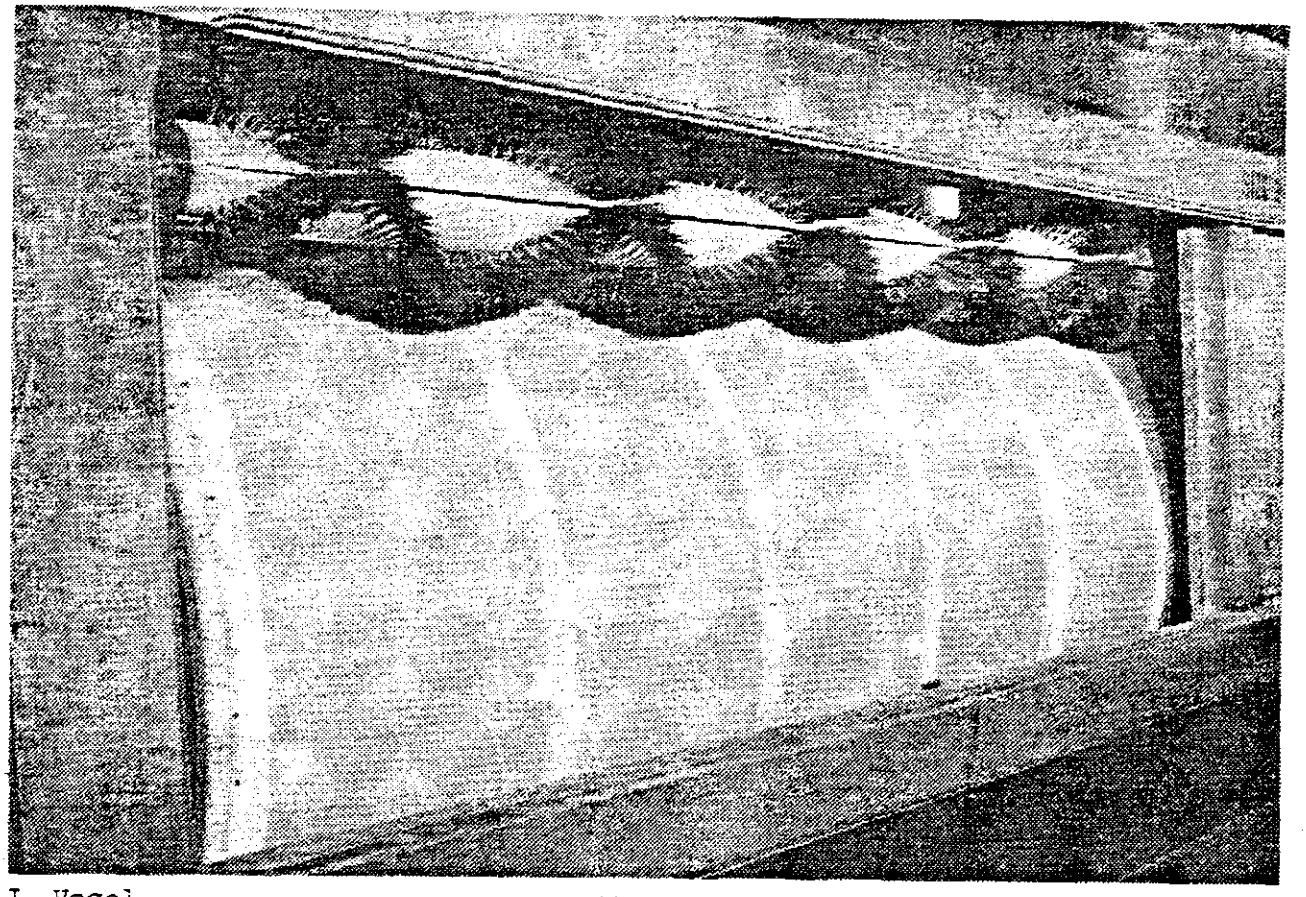
The mill's two plansifters sifted and separated all ground stock into several grades (according to size) as the material fell through the machines' ten layers of sieve trays. Each machine is suspended by maple rods and oscillated in a horizontal plane by a driving mechanism resting on the floor underneath. After the first break, the stock was elevated to one of the plansifters; anything that did not go through the top wire cloth was still very coarse and was sent back to the first break roll for regrinding. Flour produced in the first grind was separated out and sent to the Rotex sifter. The rest of the first break material went on through the plansifter sieves for grading, then was sent to the proper pair of rollers for regrinding. Several locust seeds circulated continuously on the plansifter's wire sieves to keep them clog-free, and lighter wheat grains circulated on the machine's silk sieves for the same purpose. The wheat travelled from sieve to sieve with the stock, and when it reached the bottom sieve it entered a spiral elevator which carried it to the top sieve for another cycle.

Reel #3
Style B. No. 346
E. P. Allis Company
Milwaukee, Wisconsin
275 RPM

Reel #3
Allis-Chalmers
Milwaukee, Wisconsin
Patented 1/28/1892

Flour Dresser #0
Willford & Northway Mfg. Co.
Minneapolis, Minnesota

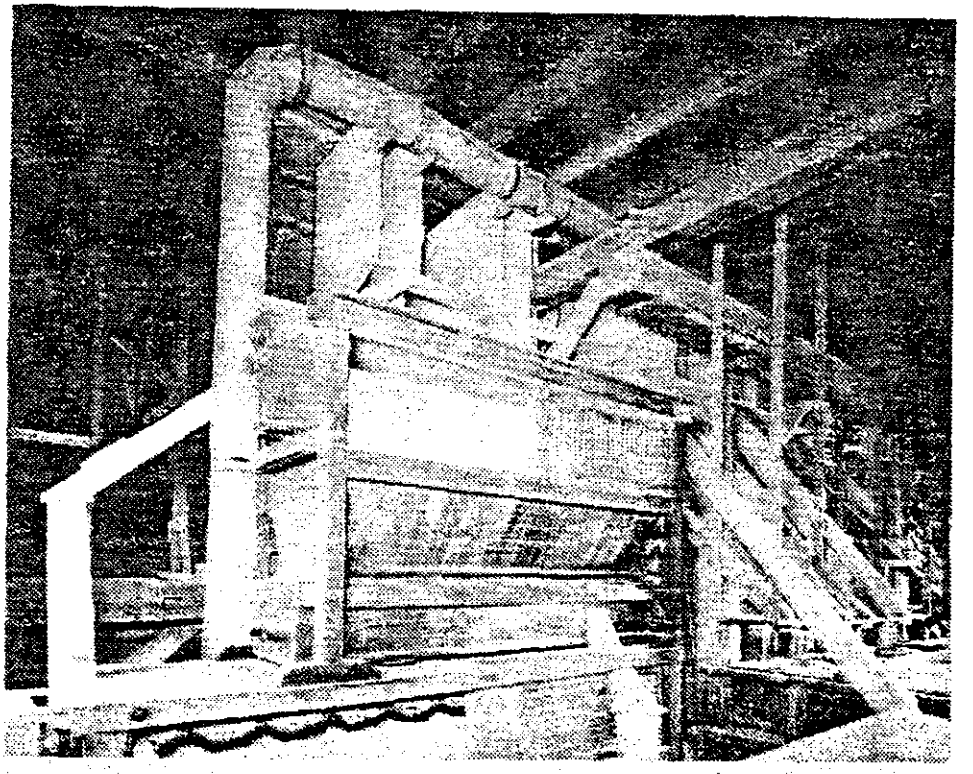
P.9



Allis Centrifugal Reel

J. Vogel

67.

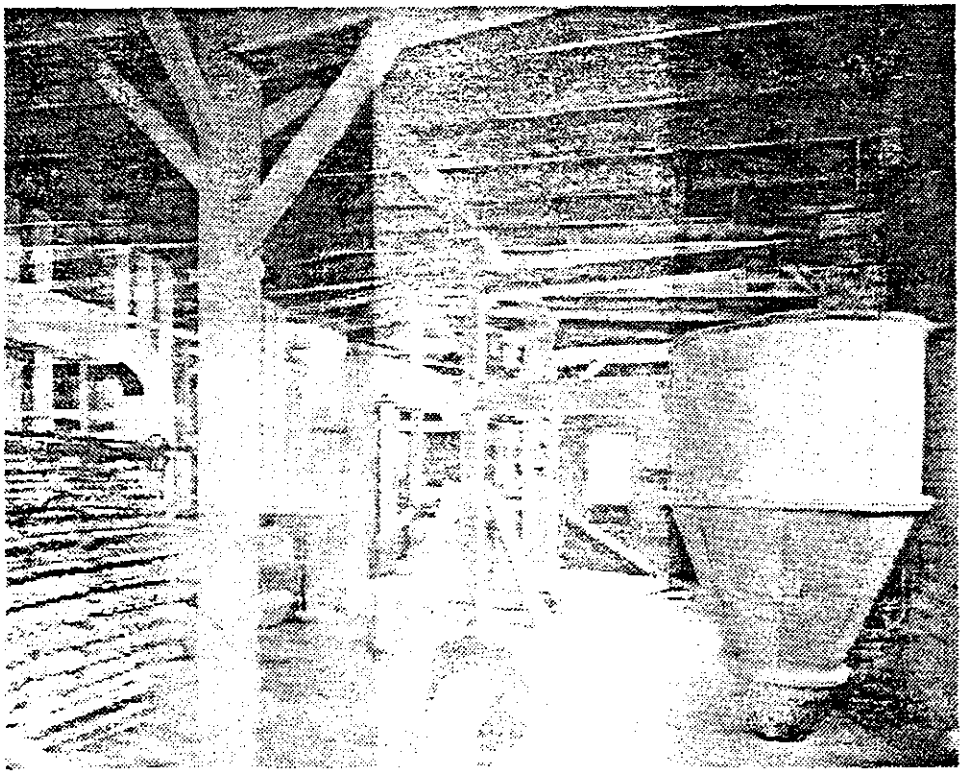


Minneapolis Centrifugal Reel, rests top of Allis reel. Corne of Grays Pat Centrifugal Reel visible lower right corner.

HAER WI-1

The three cylindrical reels resifted some of the lower grade stock that was elevated to them from three of the fourteen sets of grinding rolls (the Allis reel received stock from the fifth break roll, and the Minneapolis and Gray reels received stock from the last two middlings rolls). The reels rotated to distribute the stock over the silk screens, and built-in brushes kept the screens clog-free. Any flour was sifted out to fall into a specific conveyor below each reel, and the middlings that were too large to pass through the silk screens were either reground or packaged with the rest of the by-products.

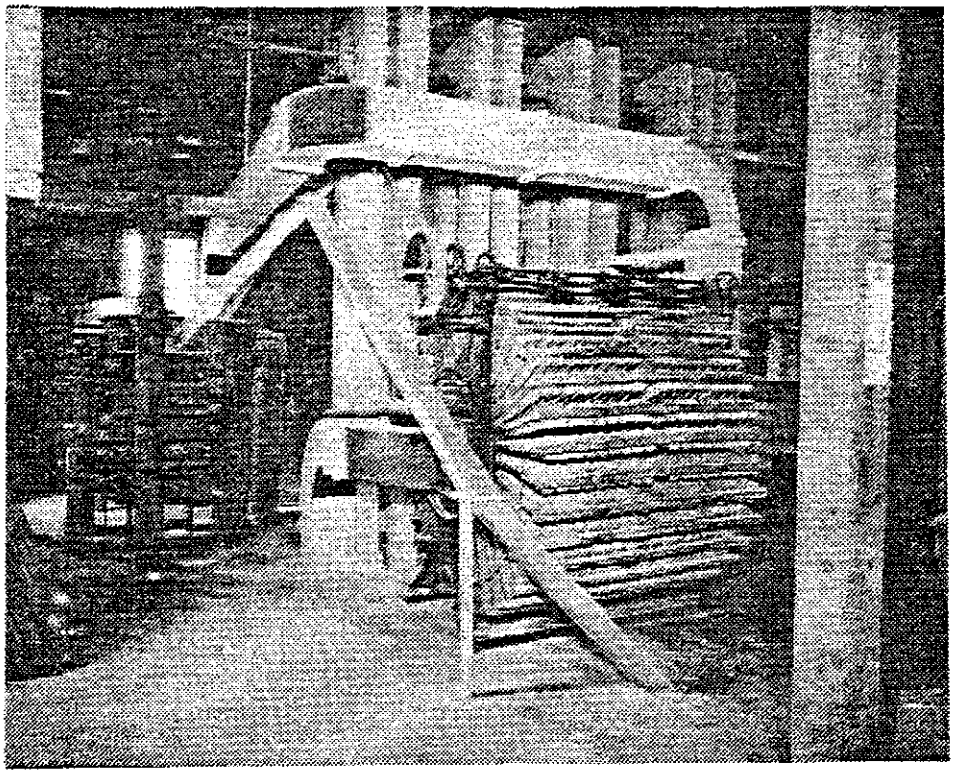
Draver Cyclone Dust Collector #7
No. 7733
Knickerbocker Co.
Jackson, Michigan
Patented 5/14/1889, #'s 403,362 & 403,363



T. Lowe 69.

This simple sheet metal cone, with no moving parts, received dust suctioned off of a sack cleaner that once stood on the second floor. The dust was fanned into the top of the cone and it came to rest against the sides by friction. The dust slid down the sides and into a conveyor at the bottom; it was then resifted to remove any flour. Until the 1930s this dust collector was on the roof of the mill.

Prime & Rau Mfg. Co.
Milwaukee, Wisconsin
First Patent Date 2/20/1883, #'s 272,473 & 272,474
Last Patent Date 5/12/1896, #'s 560,107 & 560,108

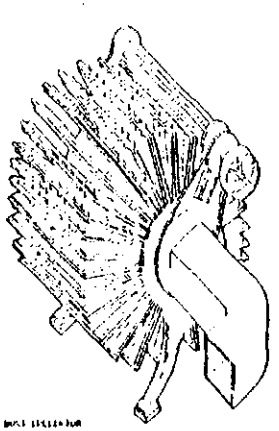


This dust collector operated in the same way as the dust collector on the second floor; however, it received dust suctioned off of the grain cleaning machines. After it was collected, most of this material was either added to the rye by-products or discarded.

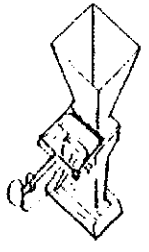
J. Lowe 70.

71. Opposite page: Flow chart of the milling process, reduced from poster created for the Fallgatter Mill Museum.

MILLING PROCESS



1



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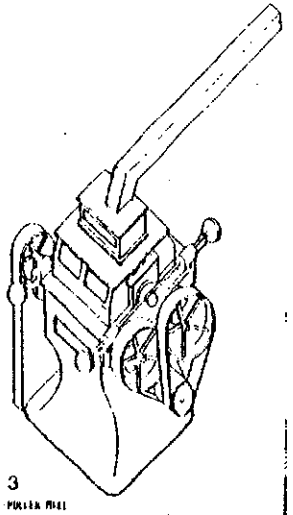

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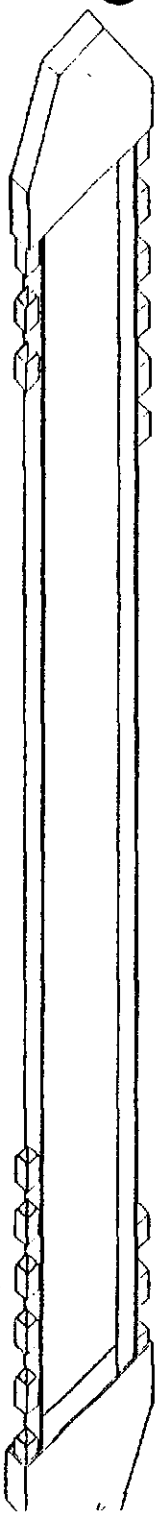

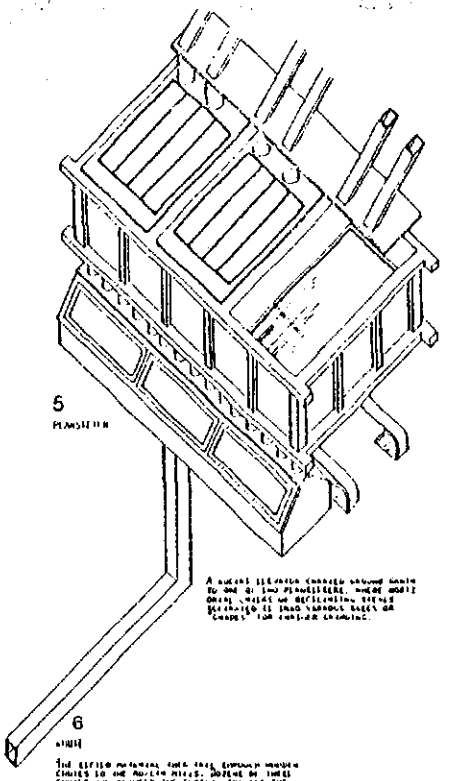

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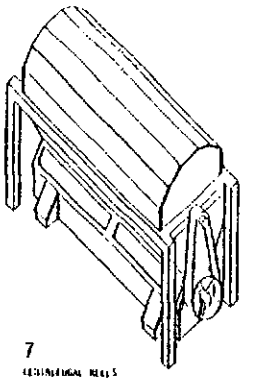

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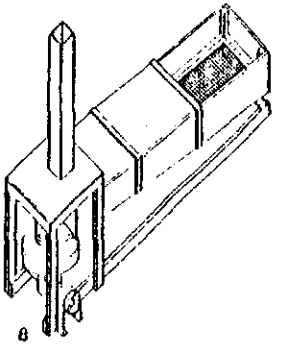


8

9

FISHER AND FALLGATTER MILL

HAER WI-1 P95

FISHER-FALLGATTER MILL BUILDINGS

FLOUR MILL - Built in 1884. 40' x 50' x 47' (height). Three story frame structure, post and beam construction. Rubble stone foundation and basement walls. Double-pitch roof. Brick chimney. 14' x 18' office in southwest corner.

GRAIN ELEVATOR - Built ca. 1908. 36' x 20' x 31'. Attached to south side of flour mill. Two-story frame over rubble stone walls. Fieldstone foundation. Double-pitch roof. Four pine bins - one 4' x 4' x 12.5'; one 6' x 6' x 12.5'; two 12' x 12' x 12.5'.

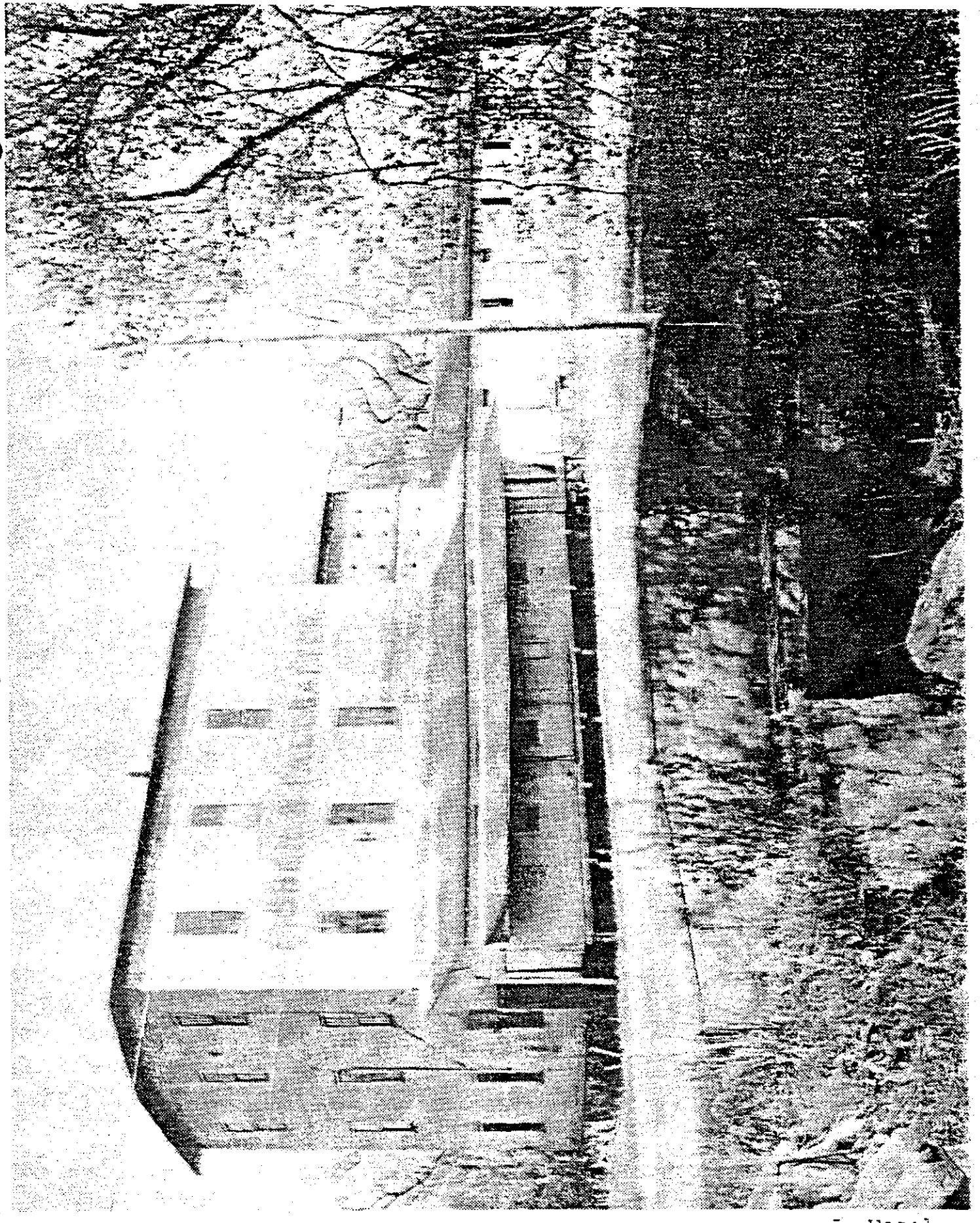
WAREHOUSE #1 - Built ca. 1908. 36' x 30' x 12'. Attached to south side of grain elevator. One-story frame over fieldstone and concrete walls and foundation. Double-pitch roof.

WAREHOUSE #2 - Built ca. 1917. 36' x 80' x 12'. Attached to south side of Warehouse #1. One-story frame over fieldstone and concrete walls and foundation. Double-pitch roof.

RECEIVING SHED - Built ca. 1908. 15'6" x 60'. Attached to west side of flour mill. One-story frame, timber foundation. Single-pitch shed roof with 44'6" x 6' canopy.

NORTH WAREHOUSE - Old potato warehouse bought and attached to north side of mill, ca. 1908. Torn down in 1970s. 20' x 62' x 12'. One-story frame, open post foundation, double-pitch roof.

FLUME - Excavated in 1384. Runs from flume entrance at millpond, under Oborn Street and to wheel pit beneath flour mill. Flume is poured concrete, with steel trash rack at entrance. Inside of flume is 7' x 11'. Wheel pit (around turbine) is 9' x 40' x 16', with rubblestone walls and timber posts, beams and joists. Plank floor supports tur bine. Concrete tailrace beneath turbine directs water out of mill, under railroad bridge and back into river. Timber bridge belongs to Soo Line Railroad.



J. Vogel

FOOTNOTES

[1]Herman Steen, Flour Milling in America (Minneapolis: T. S. Denison and Co., Inc., 1968), p. 36.

[2]Martha Zimiles and Murray Zimiles, Early American Mills (New York: Clarkson N. Potter, Inc., 1978), pp. 31-32.

[3]Robert M. Frame III, Millers to the World (Minneapolis: Minnesota Historical Society, 1977), pp. 28-29; Brooke Hindle, ed., America's Wooden Age: Aspects of its Early Technology (Tarrytown, New York: Sleepy Hollow Restorations, 1975), pp. 128-134.

[4]Frame, Millers to the World, p. 31.

[5]John Storck and Walter D. Teague, Flour for Man's Bread (St. Paul: North Central Publishing Co., 1952), p. 114.

[6]Ibid., pp. 163-169.

[7]Steen, Flour Milling in America, p. 34.

[8]Greville Bathe and Dorothy Bathe, Oliver Evans: A Chronicle of Early American Engineering (New York: Arno Press, 1972), p. 25.

[9]James L. Colwell, "From Stone to Steel: American Contributions to the Revolution in Flour Milling," The Rocky Mountain Social Science Journal 6 (October 1969), pp.20-31.

[10]Frame, Millers to the World, p. 49; John Oliver, History of American Technology (New York: Ronald Press Co., 1956), p. 368.

[11]Storck and Teague, Flour for Man's Bread, pp. 206-213.

[12]Steen, Flour Milling in America, p. 46.

[13]Publius Virgilius Lawson, "The Invention of the Roller Flour Mill," Wisconsin Historical Society Proceedings (Madison: State Historical Society of Wisconsin, 1907),pp. 248-252;Oliver, History of American Technology, p. 370.

[14]Storck and Teague, Flour for Man's Bread, pp. 246-251; Charles B. Kuhlman, The Development of the Flour Milling Industry in the United States (Afton, New Jersey: Augustus M. Kelley, 1973), p. 78.

[15]Frame, Millers to the World, p. 55.

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[17]William F. Raney, Wisconsin: A Story of Progress (New York: Prentice-Hall Inc., 1940), pp. 217-222.

[18]Robert Nesbit, Wisconsin: A History (Madison: University of Wisconsin Press, 1973), p. 181.

[19]Richard N. Current, Wisconsin (New York: W. W. Norton and Co., Inc., 1977), p 70.

[20]John G. Thompson, The Rise and Decline of the Wheat Growing Industry in Wisconsin (Madison: University of Wisconsin, 1909), pp. 103-104.

[21]Current, Wisconsin, p. 71.

[22]Nesbit, Wisconsin, pp. 328-331.

[23]U.S., Department of Commerce, Bureau of the Census, Census of Manufacturers, 1905, part 2, p. 1193; Thompson, Wheat Growing Industry, p. 399.

[24]D. L. Stinchfield, Illustrated Waupaca (Waupaca: D. L. Stinchfield, 1888), p. 10.

[25]Wisconsin Crop and Livestock Reporting Service, A Century of Wisconsin Agriculture 1848-1948 (Madison: Wisconsin State Department of Agriculture, 1948), p. 47.

[26]"Early Days in Waupaca," Waupaca Post, 3 June 1886.

[27]"Early Days in Waupaca," Waupaca Post, 10 June 1886.

[28]A. J. Lawson, "New London and Neighborhood" Collections of the State Historical Society of Wisconsin 3, 1904 reprint of 1857 edition, p. 486.

[29]Joseph Schafer, History of Agriculture in Wisconsin (Madison State Historical Society of Wisconsin, 1922), pp. 71-72.

[30]"Waupaca, " Milwaukee Sentinel, 8 May 1868; Stinchfield, Illustrated Waupaca, p. 78.

[31]John M. Ware, Standard History of Waupaca County, vol. 1 (Chicago: Lewis Publishing Co., 1917), p. 250; Stinchfield, Illustrated Waupaca, pp. 45-46.

[32]Stinchfield, Illustrated Waupaca, pp. 45-46.

[33]"Fire Fiend," Waupaca County Post, 2 February 1884.

[34]Ware, Waupaca County, p. 250.

[35]Commemorative Biographical Record of the Upper Wisconsin Counties (Chicago: J. H. Beers and Co., 1895), p. 647.

[36]Ware, Waupaca County, p. 255; "Major R. N. Roberts," Waupaca Republican, 16 January 1903.

[37]"Crescent Roller Mills," Waupaca County Republican, 26 September 1884.

[38]Ibid.; "Model Roller Mill," Waupaca Post, 28 August 1884.

[39]"Model Roller Mill," Waupaca Post, 28 August 1884.

[40]Ibid.

[41]"Crescent Roller Mills," Waupaca County Republican, 26 September 1884.

[42]Ibid.; Sanborn Map and Publishing Co., Map of Waupaca, Wisconsin 1895.

[43]"Buys a Flour Mill," Waupaca Republican, 28 June 1901; Abstract of Title, City of Waupaca, Scott Abstract Co., 20 June 1901.

[44]Interview with Donald Fallgatter, Waupaca, Wisconsin, 14 April 1979. Tape on file at State Historical Society of Wisconsin (hereafter cited as S. H. S. W.).

[45]"Another Change at the Roller Mills," Waupaca Post, 2 October 1902; Abstract of Title, City of Waupaca, Scott Abstract Co., 26 September 1902.

[46]"Fallgatter Death Friday," Waupaca County Post, 17 September 1936; Ware, Waupaca County, p. 254.

[47]Interview with Donald Fallgatter, Waupaca, Wisconsin, 14 April 1979, S. H. S. W.

[48]Waupaca High School Class of 1957,"Homes of Waupaca and Vicinity," Waupaca High School, 1957.

[49]"Appraisement, Property of Fisher and Fallgatter," Waupaca, Wisconsin (Chicago: Lloyd Thomas Co., 1918); Interview with Donald Fallgatter, Waupaca, Wisconsin, 14 April 1979, S. H. S. W.

[50]Unless otherwise cited the following information was extracted from interviews with Donald Fallgatter.

[51]Wisconsin Crop and Livestock Reporting Service, Wisconsin Agriculture, p. 90.

[52]Interview with Evan Johnson, Lind Townsnip Waupaca County, Wisconsin, 21 May 1979, S. H. S. W.

[53]"Appraisement, Property of Fisher and Fallgatter," Lloyd Thomer Co., 1918.

[54]Fisher and Fallgatter, Invoice Journal, p. 67, 30 April 1926.

[55]Ibid., p. 21, 30 April 1920.

[56]United States Patent Office, Trademark No. 229,521, Registered 28 June 1927.

[57]Interview with Evan Durrant, Waupaca, Wisconsin, 14 April 197 S. H. S. W.

[58]Ibid.

[59]U. S., Department of Commerce, Bureau of the Census, Census Of Manufacturers, 1935, p. 136; Thompson, Wheat Growing Industry, p. 105.

[60]Interview with Larry Pagel, Waupaca, Wisconsin, 7 June 1979, S. H. S. W.

[61]Interview with Evan Johnson, Lind Township, Waupaca County, Wisconsin, 21 May 1979, S. H. S. W.

[62]Fisher and Fallgatter Invoice Journal, p. 54, 30 April 1924.

[63]Interview with Evan Durrant, Waupaca, Wisconsin, 14 April 1979; Interview with Larry Pagel, Waupaca, Wisconsin, 7 June 1979, S. H. S. W.

[64]Interview with Evan Durrant, Waupaca, Wisconsin, 14 April 1979, S. H. S. W.

[65]"General Information for Milling, Baking, and Flour Trade," Northwestern Miller 276 (September 1969), p. 70.

[66]"Water Powered Mill Closes Era in State," Milwaukee Journal, 8 June 1969.

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