

CROWN ROLLER MILL  
West Side Milling District  
105 Fifth Avenue South  
Minneapolis  
Hennepin County  
Minnesota

HAER No. MN-12

HAER  
MINN  
27-MINAP  
21-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Rocky Mountain Regional Office  
Department of the Interior  
P.O. Box 25287  
Denver, Colorado 80225

## HISTORIC AMERICAN ENGINEERING RECORD

## CROWN ROLLER MILL

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21-

Location: West Side Milling District  
105 Fifth Avenue South

UTM: 15:479560:4980590

Quad: Minneapolis South, Minnesota (1967, revised 1972)

Date of Construction: 1879/1880 (alterations 1885, 1888, 1890, 1908,  
1944, 1985)

Present Owner: Hayber Development Group (at time of renovation)

Present Use: The mill was renovated for use as office space in  
1987.

Significance: The Crown Roller Mill is historically significant  
for its unusual architectural detailing and close  
association with Minneapolis' "West Side Milling  
District." Begun in 1879 and completed in 1880,  
the Crown was one in a series of flour mills built  
on the West Side during the 1870s. The new  
structure was among the largest of these mills,  
and one of the first to utilize rollers and the  
gradual-reduction milling process on a large  
scale. While most flour mills were plain,  
utilitarian structures, the Crown was unique for  
its full mansard roof, segmental arched windows,  
ornamental date and name plaque, and other  
architectural details. The Crown and other West  
Side mills helped establish Minneapolis as the  
flouring capital of the United States from 1880 to  
1930. Due to widespread mill closures in the  
1930s, the Crown Roller Mill is currently one of  
only four West Side flour mills still standing.  
In 1971, the Minnesota State Historic Preservation  
Office of the Minnesota Historical Society  
nominated the structure to the National Register  
of Historic Places as part of the St. Anthony  
Falls Historic District.

Historians: Demian Hess and Jeffrey A. Hess, January 1990

Completed in 1880, the Crown Roller Mill is historically significant for its unusual architectural detailing and close association with Minneapolis' "West Side Milling District." As one of the largest and best equipped of the West Side mills, the Crown Roller Mill helped establish Minneapolis as the flouring capital of the United States. Befitting its importance, the Crown possesses a full mansard roof, segmental-arched windows, and other architectural details which mark it as the "architectural gem" of the West Side, where most flour mills were plain, utilitarian structures. Currently, the Crown is one of only four flour mills still standing on the West Side, and is thus an important artifact of the area's past.

The West Side Milling District lies on the west bank of the Mississippi River, adjacent to the Falls of St. Anthony. It is bounded by the river, Fourth Avenue South, South Second Street, and Eighth Avenue South. The Minneapolis Mill Company acquired the land in 1856 to gain riparian title to half the waterpower of the falls. The other half of the waterpower belonged to the St. Anthony Falls Water Power Company, which owned land on the opposite shore of the river.<sup>1</sup>

In 1856-1858, the two companies cooperated in building a dam above the falls to make the Mississippi's power available for manufacturing purposes. Shaped like a giant "V" pointing upstream, the new dam guided the river into mill ponds along either shore. On the West Side, Minneapolis Mill built a power canal from the mill pond to mill seats along South First Street. When completed in 1865, the canal was approximately 900 feet long, 50 feet wide, and 14 feet deep. Minneapolis Mill sold sites along the canal to manufacturers and leased the

waterpower.

Attracted by Minneapolis Mill's improvements, a wide variety of industries settled in the West Side Milling District during the 1860s. By 1871, the area contained 25 waterpowered establishments. These consisted of ten flour mills, seven sawmills, two woolen mills, a cotton mill, a paper mill, an iron works, a sash mill, a planing mill, and a railroad machine shop. The district also contained several steam powered plants, including metal shops, woodworking establishments, and a small custom gristmill. Despite the industrial diversity of the 1860s, flour milling became the West Side's dominant industry in the 1870s. This industrial specialization was largely due to technological improvements which, almost overnight, made Minneapolis flour the most profitable product in the industry.

During the 1860s, Minneapolis millers relied on standard flouring techniques developed in Eastern flouring centers. Accordingly, millstones were set close together and run at high speeds to produce as much meal as possible from a single grinding. The meal was then sifted, or "bolted," through cloth to remove impurities. Although "low grinding" made an acceptable flour from winter wheat, the staple cereal of Eastern mills, it did not produce favorable results from spring wheat, which was grown in Minnesota. There were two problems. First, spring wheat had a more brittle husk, or bran, than winter wheat. In winter wheat, the bran separated under the millstones into large flakes that were easily removed during bolting. In spring wheat, however, the bran shattered into fine particles that were difficult to remove, discoloring the flour. Secondly, although spring wheat had a much higher gluten content than winter wheat,

its glutenous layer was also much harder---too hard, in fact, to be reduced in a single grinding. Instead of pulverizing spring wheat gluten, low grinding methods merely granulated it into "middlings," which were sifted out of the flour during bolting. Speckled with bran and lacking in gluten, spring wheat flour was no match on the market for the winter wheat product.

To improve the quality of their flour, Minneapolis millers began experimenting in the late 1860s with a "New Process" that seemed better suited to spring wheat. The most important elements of the New Process were "high grinding" and the "middlings purifier." As milling historian Robert Frame explains:

In simplified form here is how the New Process and middlings purifier worked. The wheat kernel passed through millstones set just high enough to break it up, cracking the hard center and separating the bran. This meal was fed into the purifier on a vibrating sieve. Air blasts and suction removed the light bran; larger and heavier impurities remained on the sieve, and the now-purified, white middlings passed through. These would be put back through the millstones and reduced to flour.<sup>2</sup>

The New Process was first successfully used on a large-scale in 1870, at Cadwallader C. Washburn's West Side "B Mill."<sup>3</sup> New Process flour immediately proved popular, commanding a significantly higher price than winter wheat flour produced by "low grinding." By 1875, New Process spring wheat flour was worth up to \$2.25 more per barrel than the traditional winter wheat product.<sup>4</sup> To keep pace with soaring demand, Minneapolis millers dramatically expanded their production facilities. From 1870 to 1880, seventeen new flour mills were built on the West Side. Even disaster could not stem the rising tide of mill construction. When the Washburn "A Mill" exploded and leveled five other West Side mills in

1878, all six were rebuilt and operating within two years.

Concurrent with this increase in flour milling was a decrease in other types of industrial activity on the West Side. This decline resulted partly from general economic conditions and partly from the conscious policy of the Minneapolis Mill Company. Convinced that sawmilling operations wasted waterpower, the Minneapolis Mill Company, between 1876 and 1880, purchased most of the sawmills on the West Side and, within a decade, phased them out of production. Other businesses, such as the Monitor Flow Works in 1875, and the Union Iron Works in 1879, left the district of their own accord to find more room for expansion. Still other firms, such as the Minneapolis Woolen Mill in 1875, and the Minneapolis Cotton Manufacturing Company in 1881, simply succumbed to the competitive pressures of an increasingly national market. By 1880, flour milling had become the main industry of the West Side District.

The West Side mills were a visible symbol of the flour industry's dominance over the West Side District. These new structures were among the largest of their kind ever built, and marked a new chapter in flour mill design. In the 1860s, a daily output of 500 barrels was considered extraordinary for a flour mill. However, as national demand for New Process flour swelled, West Side mills grew steadily larger. By the early 1880s, daily outputs of 600 to 800 barrels were considered typical. After being rebuilt in 1880, the Washburn A Mill had a projected daily capacity of 3,000 barrels, making it the largest flour mill in the world. The building did not hold the title long, however, for it was surpassed in both size and capacity by the Pillsbury "A Mill," built across the Mississippi from the West Side District in 1881.<sup>5</sup>

The West Side mills also ushered in an era of greater complexity in mill design and operation. Until the New Process, milling had not changed substantially since the innovations of Oliver Evans in the late eighteenth century. The entire flour mill was typically run by a single millwright, who oversaw everything from maintenance to production. With the introduction of new machines and increased capacity, however, the solitary miller was replaced by a host of laborers, each performing specialized functions.<sup>6</sup>

The unique character of the West Side flour mills was not lost on the citizens of Minneapolis. The unprecedented scale of the mills became symbols of the city's industriousness, and the mills focal points of pride. New mill construction was watched with avid interest, being routinely reported in the press like so many home-team victories.<sup>7</sup> When the Washburn A Mill was rebuilt in 1880, for example, the United States Miller boldly headlined the event: "MINNEAPOLIS' GLORY. The Largest and Finest Flouring Mill in the World. A Detailed Description of the Magnificent Washburn 'A' Mill. Its Daily Capacity Calculated to Astonish the Uninitiate--3,000 Barrels of Flour in Twenty-Four Hours."<sup>8</sup>

By the early 1880s, the West Side contained approximately two dozen flour mills. According to the Northwestern Miller, "more than one" of these mills, in terms of "size, capacity and perfection of equipment has been the wonder of . . . visitors . . . ." Yet one mill commanded special attention: "Of this cluster of mills[,] the 'Crown Roller' . . . is the most conspicuous and is the first to claim the attention of the incoming stranger."<sup>9</sup> In part, the Crown Roller Mill drew notice for its prominent siting on the highest ground in the district. Added to this, the Crown

was outstanding for its architectural detailing, size, furnishing and capacity.

Charles Morgan Hardenbergh was the driving force behind the construction of the Crown Mill. Originally from New Jersey, Hardenbergh moved to Minneapolis and established an iron works in 1862. His enterprise was originally located on the east side of the river, but he moved to the West Side Milling District in 1865. Named the Minnesota Iron Works, the new foundry was at the corner of South First Street and Fifth Avenue South.<sup>10</sup>

The Minnesota Iron Works was unusual in two respects. First, it was the only iron works in the West Side District that owned and utilized waterpower rights. Second, it was the largest company of its kind in Minneapolis. Neither consideration, however, was a strong enough inducement to keep Hardenbergh in the iron business. As flour milling profits soared in the 1870s, Hardenbergh decided to follow the trend and turn miller.<sup>11</sup> In 1878, Hardenbergh announced his intention to build a massive flour mill on the site of his iron works. The St. Paul Pioneer Press first reported the undertaking in September:

ANOTHER GREAT FLOURING MILL is to be built in Minneapolis, work to be commenced immediately, by Mr. C. M. Hardenbergh, owner of the Minnesota Iron Works [which] . . . has for sometime been leased to . . . Mr. O. A. Pray. The lease has now expired, . . . and Mr. Hardenbergh is at length enabled to carry out his pet scheme of erecting a model flour mill, on the site of his present buildings. He has sold his tools, patterns, etc., . . . and will at once begin the construction of THE MODEL FLOURING MILL OF MINNEAPOLIS, to contain twenty runs of stone, and cost \$80,000, on the site of his present machine shop and foundry. He will build of stone, or brick, will begin work at once, and will put in the latest and most improved machinery for making flour. The mill will be thoroughly built, systematically and scientifically fitted up . . . .<sup>12</sup>

Hardenbergh did not attempt to enter the flour industry on his own.

Instead, he joined the prominent Minneapolis milling firm of Christian Brothers and Company, of which the principal members were John A. and Llewellyn Christian and Charles Everett French. Christian Brothers and Company engaged William F. Gunn, a Minneapolis mill furnisher formerly of Gunn, Cross and Company, to prepare plans for the as-yet unnamed mill. Even before the plans were completed, however, work began on the foundations. In February, 1879, the Northwestern Miller reported that "work has been commenced on the excavation for C. M. Hardenbergh's new flouring mill." And in March it again alerted the public to the fact that "work has been commenced on the excavation for the foundation . . . , and Billy Gunn is hard at work on the plans."<sup>13</sup>

With plans partially prepared and the foundation excavated, Hardenbergh and the Christians secured a contractor by mid-March to erect the building. Although the exact details were still uncertain, the mill was expected to be quite substantial. In March, the St. Paul Pioneer Press headlined that the mill was to be "THE BIGGEST OF ALL," with a daily capacity of 2,000 barrels.<sup>14</sup> On March 21, the Northwestern Miller reported the structure's general dimensions and features:

The building for the Hardenburgh [sic] and Christian mill, the plans for which are now being made by W. F. Gunn, will occupy a ground space of 124 x 145 feet, and will, when completed, be larger than any mill now on the falls. From the basement floor to the bottom of the tail race the distance will be 48 feet; the basement 16 feet high, and the 1st, 2d, 3d, 4th and 5th floors will be 16, 14, 14, 15, and 20 feet respectively; the height of the 6th story or attic is not yet determined upon and will depend upon the style of the roof which covers the structure. The first floor will be about three feet nine inches above the level of the side track on the west side of the mill, and the height of the mill from the eaves to the ground will be in the neighborhood of ninety feet . . . . The ground space of 124 x 145 feet includes room for a fireproof storage warehouse with a capacity of 90,000 bushels of wheat. The building is to be of light colored brick with red brick trimmings and window sills of Ohio stone.<sup>15</sup>

The roof issue was shortly resolved, for on March 28, the Northwestern Miller stated that "the Hardenburgh [sic] mill will have a French roof of iron."<sup>16</sup> The incorporation of a mansard, or "French", roof was significant, for it revealed Hardenbergh's commitment to erecting an imposing and "model" mill. As architectural historian Donald R. Torbet has pointed out, the mansard roof first appeared in Minneapolis in 1864 and "for almost twenty years thereafter . . . was the pre-eminent stylish motif, alone sufficient to mark any building as fashionable . . . ." <sup>17</sup> By contrast, most Minneapolis mills were plain, utilitarian structures. Architectural detailing consisted primarily of simple pilaster strips, arched window openings, and cornices, usually confined to a single, primary facade. For the most part, mill designers relied on the sheer size of their structures for visual impact. Breaking with this trend, Hardenbergh's mill was to combine mass, siting and architectural styling for maximum visual effect.<sup>18</sup>

Further proof of the mill's progressive design came in August, 1879, when its name was first unveiled: The Crown Roller Mill. The appellation was important, for it signaled that rollers were to be employed rather than traditional millstones. Up until that time, roller mills were not widely used in American milling. Although the new technology was a potential improvement over millstones, which were expensive to manufacture and difficult to maintain, early roller mills were plagued by technical problems which limited their appeal.<sup>19</sup>

The situation began to change in 1878, when William Dixon Gray, formerly a Minneapolis mill engineer, redesigned and improved the roller mill marketed by the Edward P. Allis Company of Milwaukee. Gray convinced

Cadwallader C. Washburn to install the new machine in the "Experimental C Mill," which was being built in the wake of the 1878 explosion. In addition to installing the roller mills, Gray conceived of an entirely new system for producing flour. Termed the "gradual reduction process," Gray's new system differed from the "New Process" in that it subjected the middlings to a much more elaborate and automatic series of grindings and purifications. The net result was faster production of a much larger quantity of high-quality flour.

Gray completed his design of the Washburn Experimental C Mill in January, 1879, making it the first modern, automatic, all-roller, gradual reduction flouring plant. Unfortunately, most Minneapolis millers ignored Washburn and Gray's innovation. When the six mills leveled in the 1878 explosion were rebuilt, all were fitted for the outdated New Process system.<sup>20</sup>

The Crown Roller Mill, however, was a notable exception. Not only did the mill employ rollers, but it adopted the gradual reduction process as well. When the Crown began operation in 1880, the Northwestern Miller stated: "The mill, as constructed, . . . is worked on the gradual reduction or high grinding system, improved and perfected as far as American ingenuity has yet been able to go."<sup>21</sup> As one historian has observed, the Crown Roller Mill was one of the few "Minneapolis plants which thoroughly demonstrated the superiority of graduated steel rollers over old-fashioned buhr stones."<sup>22</sup>

Construction of the Crown Roller Mill began on April 14, 1879, when workers set the cornerstone. By October, the contractor had largely completed the exterior, and work began to furnish the mill.<sup>23</sup> On May 21,

1880, the Northwestern Miller announced that half of the mill had been fitted and was producing 1,000 barrels of flour a day (see HAER Photo No. MN-12-28; also see Supplementary Data Section for copy of Northwestern Miller article). It went on to publish a detailed tour of the structure:

The foundation and basement walls are of native blue limestone, four feet thick, and resting on the solid limestone ledge which forms the crest of the falls of St. Anthony. Above these enduring foundations the massive walls of cream colored brick rise to a height of about seventy-five feet, and the whole is surmounted by a mansard roof, which forms the sixth or attic story of the building, and makes the total height of the building over one hundred feet from the ground. The roof is of galvanized iron, and in spite of its great size the building is of most tasty finish . . . .<sup>24</sup>

In addition to the mansard roof, unusual detailing included an ornate stone date and name plaque centered in the west facade, and decorative brick segmental window arches that were further enhanced by stones at the spring points and key (see HAER Photo No. MN-12-9).<sup>25</sup> Other details on the Crown Mill were more typical. As in other West Side brick flour mills, fenestration was located within panels created by raised brick pilaster strips. The pilasters were joined at the top by a brick band, and arches over each pilaster suggested column capitals (see HAER Photo No. MN-12-1).

The south end of the mill was equipped as an elevator to store grain. The elevator's location was marked on the south facade by the lack of fenestration (see HAER Photo Nos. MN-12-4, MN-12-18, MN-12-19, MN-12-20). To reduce the risk of fire, the elevator was partitioned from the rest of the mill by a brick firewall which rose above the roof and, according to the Northwestern Miller, "through which there is only one opening into the mill. The passageway through the elevator on the first floor is arched over with brick, so that there is no communication with the elevator except through small [iron] doors on either side [of the passageway] . . . ." The

elevator stored grain in 30 circular iron bins, each measuring 7 1/2 feet in diameter and 66 feet in depth. The Northwestern Miller estimated the elevator's capacity at 98,000 bushels.

The remainder of the mill was chiefly devoted to flouring and dust control operations. At the time of the 1880 article, grinding operations were located on the first, second, and third floors, as well as the basement. Although rollers were chiefly employed, millstones were located in the basement and on the first floor. The main roller milling operation was located on the second floor, and consisted primarily of "Gray's double corrugated" and "Downton's smooth four roller mills." Middlings separation equipment, bolting chests, and reels were distributed throughout the mill from the third to the sixth floors. "Bean Dust Collectors" were located on each floor, and filtered the purifier exhaust to remove explosive flour dust (see Supplementary Data Section for further information on the mill's layout and operation).

Waterpower supplied the motive force for all machinery in the mill. A brick headrace conveyed water to a 30 x 30-foot stone forebay located under the southeast corner of the basement (see HAER Photo No. MN-12-21). The forebay emptied into two circular, brick-lined wheel pits, each twelve feet in diameter (see HAER Photo Nos. MN-12-24, MN-12-25). At the time of the Northwestern Miller article, only one wheel pit had been furnished. It contained a vertical, 48-inch, 400-horsepower, "New American" turbine, which operated under a 32-foot head and was manufactured by Stout, Mills and Temple of Dayton, Ohio. Bevel gears connected the turbine shaft to the main drive shaft in the basement. The main shaft, in turn, transmitted power to line shafts on the first, second and fourth floors of the mill by

means of belts and pulleys. A vertical shaft, bevel-gearred to the fourth floor line shaft, transmitted power to the fifth and sixth stories.

According to the Northwestern Miller, a separate vertical shaft ran off the main drive to power "all of the cleaning machinery" in the mill. The Crown Mill's grain elevator drew power from the main drive by means of a friction clutch, "by which the elevator machinery can be stopped and started without interfering with the workings of the mill."

The owners of the Crown Mill went to great lengths to limit the danger of fire. In addition to the dust control equipment and heavy firewall separating the mill and elevator, the owners installed firehoses and placed fire extinguishers, water barrels and buckets on each floor. Christian Brothers and Company also installed a system of speaking tubes and "signal wires" to allow communication throughout the mill. Other amenities included gas lighting, and a brick boiler house attached to the east side of the plant to provide steam heat.

By 1881, the daily capacity of the Crown Mill had risen to 2,400 barrels.<sup>26</sup> Although the mill matched or exceeded the expectations of its planners in terms of its furnishing, beauty and capacity, it did not prove to be the "biggest of all." By 1881, several other "mammoth" mills had begun operation at the falls, including the completely rebuilt Washburn A Mill, and the Pillsbury A Mill. In 1880, these massive flouring plants elevated Minneapolis to the exalted position of largest flour producer in the country, a status it maintained for the next fifty years. As the Minneapolis Tribune observed, "During the year 1880 the mills of Minneapolis manufactured more flour than any other city in America and the capacity for the year just entered upon is double that of any city in the

country, to which the three largest mills on the continent--the Pillsbury A, Washburn A, and Crown Roller--contribute."<sup>27</sup>

Over the next decade, Christian Brothers and Company made extensive improvements to the Crown Mill. Among these changes, the owners installed new purifying and bolting equipment, and gradually increased the number of rollers. In 1880, the mill operated 58 roller mills. This number rose to 65 by 1882, and 75 by 1885. Due to these modifications, daily capacity rose from 1,000 barrels in 1880, to 2,500 by 1890. To provide power for increased production, Christian Brothers and Company installed two 54-inch New American turbines in 1885.<sup>28</sup>

Unfortunately, severe water shortages throughout the 1880s seriously hampered operations at the Crown and other West Side mills. In 1885, Christian Brothers and Company purchased a 300-horsepower steam engine to provide supplemental power. Mounted in the basement, the engine was manufactured by the Wright Steam Engine Works of Newburgh, New York. To provide the necessary steam, the owners enlarged the boiler house and installed an extra boiler.<sup>29</sup>

The new engine immediately proved its worth, for low water continued to be a serious problem in 1886. At the end of the year, the Northwestern Miller observed: "The Crown Roller finds its engine a very useful article at the present time, being able by its possession to get out a very respectable amount of flour. Mr. Christian says that he won't be caught another year with low water without a second engine, and then water power can 'go to thunder.'"<sup>30</sup> True to his word, Christian installed a second Wright engine in 1889, and enlarged the boiler house in 1888 and 1890. The owners also substantially improved the mill's fire safety in 1890 and 1891,

constructing a new dust house, installing automatic sprinklers, and replacing gas lighting with electricity.<sup>31</sup>

Christian Brothers and Company's improvements to the Crown Mill reflected a general trend in the West Side Milling District. The period 1880 to 1930 was marked by widespread efforts to increase efficiency on all levels of the flour industry. It was, as the editor of the Northwestern Miller observed at the time, "an era of consolidation."<sup>32</sup> In architectural and technological terms, owners extensively improved existing mills to increase production rather than undertake new construction. Mill interiors became dense jungles of machinery, while exteriors were flanked by auxiliary structures, such as engine rooms, boiler houses, warehouses, packaging facilities, train sheds and grain elevators. A writer expressed this trend in 1885, when he wrote: "As in former seasons Minneapolis . . . has shown a considerable gain in milling capacity. Aside from the completion of the Pillsbury B, no new mills have been added . . . , but there are a number of instances where the mills have had their capacity augmented several hundred barrels by the addition of machinery."<sup>33</sup>

The trend toward consolidation was most apparent in terms of mill ownership. In 1882, two firms controlled approximately 51 percent of the daily production capacity of Minneapolis mills, while the remaining production was divided more or less evenly between sixteen different firms. By 1890, four large corporations controlled 87 percent of the city's milling capacity; and by 1900, three corporations managed 97 percent of the total flour production.<sup>34</sup>

Just as with the changes in milling technology, the Crown Mill was at the center of the changes occurring in mill ownership. Under the leadership

of John Martin, a Minneapolis lumberman turned miller, a single corporation acquired the Crown and five other West Side mills in 1891 to form the Northwestern Consolidated Milling Company. Northwestern Consolidated eventually operated nine flour mills and several elevators in Minneapolis.<sup>35</sup> In a statement published shortly after its formation, the company explained that combining the operations of the Crown and other mills allowed it to produce flour with greater economy in an increasingly competitive market:

It is conceded by close students of the commercial and industrial interests of this country that the tendency of the times is toward consolidation of the same, and the intense competition which has brought about the present era of small profits has forced those who would successfully undertake the manufacture of flour to avail themselves of great economies in cost of production, purchasing of supplies, handling and disposal of product, etc., which can only be secured by the most extensive establishments.<sup>36</sup>

The new owners continued to increase the capacity of the Crown Mill, renamed the "Consolidated A Mill," by modifying equipment, installing more roller mills, and updating the waterpower turbines. By 1912, daily capacity had reached 3,500 barrels.<sup>37</sup>

Improvements also continued in the mill's steam plant, most notably, a brick boiler-house addition in 1908. Equipped with a 175-foot-high reinforced-concrete smokestack, the boiler house fronted 90 feet on South First Street, extending back along the mill's east elevation for 140 feet. It contained two main sections. The northwest half served as an engine room and coal storage area, while the section to the southeast housed the boilers (see HAER Photo Nos. MN-12-7, MN-12-8, MN-12-26, MN-12-27). The company installed a new steam turbine in 1916.<sup>38</sup>

Northwestern Consolidated also made several changes in an attempt to

centralize operations. In 1908, it constructed the "A Elevator" at the corner of South First Street and Fifth Avenue South, just south of the Crown Roller Mill, to supply grain to all of its West Side mills. Shortly afterwards, the owners built a conveyor from the sixth floor of the Crown to the A Elevator (see HAER Photo No. MN-12-29; also see HAER Documentation for the Consolidated A Elevator, HAER No. MN-16). Eventually, they converted half of the Crown's internal elevator to warehouse space, reducing the mill's grain storage capacity to 35,000 bushels.<sup>39</sup>

Operations were further integrated when Northwestern Consolidated converted the Crown's boiler house to serve as a central generating plant in 1910. The Northwestern Miller reported: "The Northwestern Consolidated Milling Co., Minneapolis, is making important improvements to the power plants in the C, D, E and F mills. The steam auxiliary plants at these mills are being replaced with electric motors, which are to be driven by the steam turbine at the central power plant at the A mill [Crown Roller Mill]." <sup>40</sup>

This string of improvements appears to have ended in the 1920s. At that time, significant changes in wheat quality, freight rate structure and tariff policy combined to seriously reduce the demand for Minneapolis-produced spring wheat flour. Faced with a dwindling market, Northwestern Consolidated began to cut back production and close many of its West Side mills. By 1929, the Crown Mill was one of only two Northwestern Consolidated plants in operation.<sup>41</sup> During this same time period, the other great Minneapolis flour corporations, such Pillsbury and General Mills, also began to close their area mills and shift operations to other cities, such as Buffalo and Kansas City. Due to these closures,

Minneapolis finally ceded first place in flour production to Buffalo in 1930.<sup>42</sup>

In 1932, Northwestern Consolidated became a division of Standard Milling Company of Delaware. Northwestern Consolidated had actually operated as a wholly-owned subsidiary of Standard Milling since 1902. The latest reorganization was undertaken to consolidate operations and halt the company's declining market share.<sup>43</sup>

In an attempt to reduce expenses, Standard decided to electrify the Crown Mill's operations in 1933. At that time, the company still held waterpower leases for the six mill sites once controlled by Northwestern Consolidated. Since it only operated the Crown and one other West Side mill, Standard believed it would be more economical to sell the leases and electrify its properties than continue to pay for unused water. The Northwestern Miller wrote:

The Northwestern Consolidated Milling Division of the Standard Milling Co. has started work on probably the greatest departure in milling circles here in the last decade or two. It has sold its leases in the St. Anthony Falls water power and is electrifying its remaining active units. . . . The total expenditure may aggregate \$100,000, but the work is being undertaken as a matter of economy, because it was unprofitable to continue owning six water leases, with only two mills actually in operation."<sup>44</sup>

In 1941, Standard Milling Company conducted a study to determine which of its properties to close. Although the report noted the "relative efficiency" of the Crown Mill, it also faulted the structure's nineteenth-century design: "Its daily capacity of 8,000 cwts. [100-pound units] is contained in one unit and . . . [has no facilities for] bulk flour storage . . . . [This] single unit arrangement of machinery provides no flexibility in milling operations, and the layout of the mill is poor

for the economical storage, handling and shipping of the finished product."<sup>45</sup> The Crown Mill remained in operation, but its days were numbered. In 1944, Standard made its last major alteration when it replaced the Crown's mansard roof with a one-story brick addition (see HAER Photo Nos. MN-12-11 )<sup>46</sup>

In 1953, Standard Milling estimated that the Crown was operating at a yearly loss of \$202,000. Faced with mounting deficits, the company decided to stop production at the Crown Roller Mill on June 30, 1953.<sup>47</sup>

Standard Milling apparently used the Crown Mill as a warehouse until it sold the building in the late 1950s. Until the mid-1970s, the Crown was used for warehouse and light industrial purposes.<sup>48</sup> In 1971, the Minnesota Historic Preservation Office (SHPO) of the Minnesota Historical Society recognized the mill's historical significance by naming it a contributing property in the St. Anthony Falls Historic District. By that time, due to the widespread abandonment of the West Side Milling District, the Crown was one of only four flour mills still standing which dated to the district's heyday as the flouring capital of the United States.<sup>49</sup>

In the late 1970s and early 1980s, several developers proposed to renovate the Crown Roller Mill for use as luxury apartments. These plans received a serious setback on the night of October 21, 1983, when a fire completely gutted the building and left only the exterior walls standing. Owing to the structure's instability, the Minneapolis City Council initially decided to demolish the mill. However, under pressure from area preservationists and faced with high demolition costs, the Council eventually agreed to shore-up the structure.<sup>50</sup>

In 1984, the Hayber Development Group of Minneapolis acquired the Crown

and several other properties in the West Side Milling District as part of the so-called "Block 10" redevelopment project. In light of the structure's historical significance, the developer, City Council, and SHPO entered into a Memorandum of Agreement stipulating that the Crown Roller Mill be recorded according to "Level II Standards" of the Historic American Engineering Record/Historic American Buildings Survey of the National Park Service.

In October 1985, large-format photographs were taken to document the condition of the mill prior to reconstruction. The developers then removed debris from the mill's interior. Renovation work began in 1987. Using new brick to match the original, collapsed portions of the exterior walls were rebuilt, and a new standing-seam, copper-clad mansard roof with pedimented, gable dormers was constructed. Other changes included new window openings in the south facade, installation of new metal sashes in existing window openings, and the creation of a new primary entrance in the west facade. During remodeling, the mill's 1914 turbines were discovered intact in their wheel pits. One turbine was removed so that the wheel pit and tailrace could be used as a storm sewer. The other turbine was preserved in its wheel pit. The Crown Mill and its 1908 boiler house are currently used as office space. This report is intended to complete the documentation requirements for the structure.

#### Notes

1. Unless otherwise noted, this history of the West Side Milling District and other portions of this report were drawn from a study prepared by MacDonald and Mack Partnership, and others, for the Minneapolis Riverfront Development Coordination Board, entitled Saint Anthony Falls Rediscovered (Minneapolis: Minneapolis Riverfront Development Coordination Board, 1980). Jeffrey A. Hess, a joint author of this report, was responsible for the

historical sections of the previous study. For additional information see: Robert M. Frame, Millers to the World: Minnesota's Nineteenth Century Water Power Flour Mills (St. Paul: Minnesota Historical Society, 1977); Lucile M. Kane, The Falls of St. Anthony, 2nd ed. (St. Paul: Minnesota Historical Society Press, 1987).

2. Frame, Millers to the World, p. 51.

3. For an extensive history of the New Process, see Robert M. Frame, "The Progressive Millers: A Cultural and Intellectual Portrait of the Flour Milling Industry, 1870-1930, Focusing on Minneapolis, Minnesota" (Ph.D. dissertation, University of Minnesota, 1980), pp. 41-59.

4. Ibid., p. 53.

5. In 1866, Cadwallader C. Washburn built the "B Mill," which was then the largest mill in Minneapolis, having a daily capacity of approximately 500 barrels; see Edward Duffield Neill, History of Hennepin County and the City of Minneapolis (Minneapolis: Northstar Publishing Company, 1881), p. 393. The mill was promptly dubbed "Washburn's Folly," for, as the Northwestern Miller observed: "An output of five hundred barrels of flour in those days of unprogressive methods was considered enormous . . ." (E. B. Barnes, "The Milling History of Minneapolis," Northwestern Miller 30 (1890): 30-35). By 1882, the West Side contained 19 mills, 13 of which produced 500 or more barrels of flour a day; see "The Mills of Minneapolis," Northwestern Miller 14 (October 15, 1882): 7. For a complete history of the construction of the Washburn and Pillsbury mills, see Frame, "The Progressive Millers," pp. 96-129; also see the documentation for the Washburn A Mill Complex, HAER No. MN-11, and for the Pillsbury Mill Complex, HABS No. MN-29-5.

6. Frame, "The Progressive Millers," pp. 85-92, speaks extensively of the "growth of complexity" in Minneapolis mills. He summarizes the changes in the industry when he writes:

"The rapid introduction and acceptance of the middlings purifier and the roller mill in the 1870s was followed by a dramatic increase in mill size and complexity. The new process and gradual reduction milling brought not only new machines but complex new arrangements of equipment, housed in giant new buildings, and operated by armies of workers. In time, there also were increasingly elaborate corporate structures to manage combinations of mills which were becoming involved in far-reaching networks of domestic and international trade" (p. 85).

7. Ibid., 92-96. Frame writes:

". . . In Minneapolis . . . it was not a matter of building merely large mills but huge, gigantic mills, which were immediately celebrated as being the largest flour mills in the world.

"Minnesota millers and non-millers alike, from the 1870s onward, were in absolute awe of the 'mammoth mills' which were erected at the Falls of St. Anthony" (p. 95).

8. United States Miller 9 (August 1880): 55, quoted in Frame, "The Progressive Millers," p. 106.

9. "The Crown Roller Mill," Northwestern Miller 9 (May 21, 1880): 321.
10. Horace B. Hudson, ed., A Half Century of Minneapolis (Minneapolis: Hudson Publishing Company, 1908), p. 342.
11. This discussion of the Minnesota Iron Works closely follows Saint Anthony Falls Rediscovered, p. 48.
12. "Another Big Flouring Mill, C. M. Hardenbergh About to Invest \$80,000 in a Twenty Run Mill, on the Site of His Foundry and Machine Shop," St. Paul Pioneer Press, September 14, 1878, p. 6, col. 2, transcript number 511 in Works Progress Administration Papers, Box 96, Minnesota Historical Society, St. Paul (collection hereafter referred to as WPA Papers).
13. Hudson, A Half Century of Minneapolis, p. 342; American Miller v. 7 n. 6 (June 1879): 171; Northwestern Miller 7 (February 7, 1879): 86; *Ibid.*, 7 (March 7, 1879): 147.
14. "The Biggest of All," St. Paul Pioneer Press, March 15, 1879, p. 6, col. 4, transcript number 1115, WPA Papers, Box 99. The article also stated: "On Thursday Messrs. Hardenbergh & Christian closed a contract with Mr. Todd, for the construction of their new flouring mill at the platform, the immense structure to be completed by the 1st of August next, and placed in operation in October following."
15. Northwestern Miller 7 (March 21, 1879): 174.
16. *Ibid.*, 7 (March 28, 1879): 187.
17. Donald R. Torbet, A Century of Minnesota Architecture (Minneapolis: Minneapolis Institute of Arts, 1958), n. p.
18. A detailed description of typical West Side mill construction can be found in Saint Anthony Falls Rediscovered, pp. 39-43.
19. St. Paul Daily Globe, August 29, 1879, p. 3, col. 1, transcript number 2435, WPA Papers, Box 99; The following history of the roller mill and the gradual reduction process relies on Frame, "The Progressive Millers," pp. 64-77.
20. On the Washburn Experimental C Mill and Minneapolis millers' reluctance to adopt the gradual reduction process see Frame, "The Progressive Millers," pp. 73-74.
21. "The Crown Roller Mill," Northwestern Miller 9 (May 21, 1880): 324.
22. Marion Daniel Shutter, History of Minneapolis (Chicago and Minneapolis: S. J. Clarke Publishing Company, 1923), p. 367.
23. St. Paul Daily Globe, April 15, 1879, p. 2, col. 5, transcript number 2296, WPA Papers, Box 96; Northwestern Miller 8 (October 3, 1879): 219.

24. The following description of the Crown Roller Mill is drawn from: "The Crown Roller Mill," Northwestern Miller 9 (May 21, 1880): 321 (see Supplementary Data Section). The quote is from p. 321.
25. All directions conform to the city street grid. By this convention, Fifth Avenue is assumed to run north toward the river, while First Street runs east to west.
26. Neill, History of Hennepin County and the City of Minneapolis, p. 396; Minneapolis Tribune, May 15, 1881, p. 11, cols. 4-5.
27. "Milling Statistics," Minneapolis Tribune, May 15, 1881, p. 9, col. 6.
28. Information on the mill's furnishing at various times has been drawn from the following sources: Northwestern Miller 14 (October 16, 1882): 7; Minneapolis, Minnesota, v. 1 (New York: Sanborn Map Publishing Company, 1885), plate 2 (hereafter referred to as "1885 Sanborn"). For the 1890 capacity of the Crown Mill, see Barnes, "The Milling History of Minneapolis," p. 35. For information on the turbines, see Northwestern Miller 19 (June 12, 1885): 561.
29. See Kane, The Falls of St. Anthony, pp. 114-133 for a discussion of the increasing shortage of waterpower during the 1880s. To compensate for the shortage, Christian Brothers and Company installed a steam engine and an additional boiler in 1885; see the Northwestern Miller 19 (June 5, 1885). For a record of the expansion of the boiler house see Building Permit A 142, dated November 4, 1885, Minneapolis Inspections Department.
30. Northwestern Miller 22 (December 10, 1886).
31. Christian Brothers and Company planned a two-story brick boiler house and flour storage area on the southeast side of the Crown Mill in 1888; see the Northwestern Miller 26 (August 10, 1888): 164. However, there is no indication that this was carried out. A one-story brick shed was built instead; see Building Permit A 1065, dated September 13, 1888, Minneapolis Inspections Department. The shed, housing a boiler, is depicted in Minneapolis, Minnesota, v. 2 (New York: Sanborn Map Publishing Company, 1890), plate 2 (hereafter referred to as "1890 Sanborn"). The boiler house was enlarged once again in 1890, see Building Permit A 2111, dated September 22, 1890, Minneapolis Inspections Department. The new structure is depicted in Atlas of Minneapolis, vol. 4 (Chicago: Rascher Insurance Map Publishing Company, 1892), plate 367 (hereafter referred to as "1892 Rascher"). For information on the steam engine installed in 1889, see the Northwestern Miller 28 (October 4, 1889): 374. For additional improvements in 1890-1891, see the following: Building Permit A 2523 (dated July 20, 1891); Electric Permit F 287 (dated August 28, 1891), Minneapolis Inspections Department; 1892 Rascher.
32. Northwestern Miller 28 (November 8, 1889): 547.
33. A Tale of Two Cities: Minneapolis and St. Paul Compared (Minneapolis: Johnson, Smith and Harrison, Printers, 1885), p. 38.

34. The figure for 1882 is based on "The Mills of Minneapolis," Northwestern Miller 14 (October 15, 1882): 7. The statistics for 1890 and 1900 are from Saint Anthony Falls Rediscovered, p. 37.

35. For information on the Northwestern Consolidated Milling Company and John Martin, see the following sources: "A Mammoth Flour Making Establishment," Northwestern Miller 32 (November 27, 1891): 753; St. Anthony Falls Rediscovered, p. 46; Pen and Sunlight Sketches of Minneapolis (Minneapolis: Phoenix Publishing Company, 1893), pp. 104-105; Shutter, History of Minneapolis, p. 368.

36. Northwestern Miller 32 (July 24, 1891): 110.

37. The changes in the mill's production equipment are recorded on the following insurance maps: 1892 Rascher; Atlas of Minneapolis, v. 4 (Chicago: Rascher Insurance Map Publishing Company, 1892, updated c. 1906), plate 367; Minneapolis, Minnesota, v. 3 (New York: Sanborn Map Publishing Company, 1912), sheet 248-249 (hereafter referred to as "1912 Sanborn"). Capacity is recorded on 1912 Sanborn. The installation of the new turbines are recorded in the following issues of the Northwestern Miller: v. 33, April 1, 1892, p. 487; July 25, 1900; September 16, 1914.

38. For the dates of the new power house's construction, refer to the following Building Permits, held in the Minneapolis Inspections Department: A 10212 (dated July 23, 1908); A 10272 (dated September 18, 1908); A 10295 (dated October 7, 1908). The building is depicted in 1912 Sanborn. For information on the 1916 turbine, refer to Northwestern Miller 108 (October 18, 1916): 164, 175.

39. A brief history of the Consolidated A Elevator can be found in St. Anthony Falls Rediscovered, pp. 47-48. The conveyor and the alteration of the Crown's elevator are shown on the following insurance maps: 1912 Sanborn; Minneapolis, Minnesota, v. 3 (New York: Sanborn Map Company, 1912, updated to c. 1927), sheet 234.

40. Northwestern Miller 83 (September 14, 1910): 666.

41. The problems in the flour industry are briefly discussed in St. Anthony Falls Rediscovered, p. 38. For the difficulties faced by Northwestern Consolidated in particular, see Paul M. German, "Standard Milling Company," unpublished corporate history, c.1978 (copy made available by the Uhlmann Company, Kansas City, Missouri).

42. St. Anthony Falls Rediscovered, p. 38.

43. Northwestern Consolidated actually became a wholly-owned subsidiary of the United States Flour Milling Company in 1899. In 1902, Standard Milling formed to serve as a holding company for all of United States Flour Milling's properties. Despite these takeovers, Northwestern Consolidated continued to operate on a largely independent basis. In 1929, however, Standard Milling was taken over by the Gold Dust Corporation, a New York-based conglomerate. Gold Dust operated Standard Milling as a

wholly-owned subsidiary, and in 1932, it consolidated that company's operations in an attempt to improve productivity and cut costs; see German, "Standard Milling Company," pp. 54-61.

44. "N. W. Consolidated to Electrify Mill Units," Northwestern Miller 173 (February 15, 1933): 394.

45. St. Anthony Falls Rediscovered, p. 47.

46. German, "Standard Milling Company," pp. 79-80.

47. *Ibid.*, p. 134.

48. Information on building use from the 1950s to the 1970s is derived from Minneapolis City Directories.

49. Minnesota Historical Society, "National Register Nomination Form for St. Anthony Falls Historic District," unpublished, 1971; copy on file at the Minnesota SHPO. For the state of the West Side Milling district in the 1970s, see St. Anthony Falls Rediscovered, pp. 33-58.

50. "Brick Walls Collapse as Fire Destroys Downtown Mill," Minneapolis Star and Tribune, October 22, 1983, p. 1A; "Crown Roller Mill's Burned-Out Shell to be Demolished This Week," Minneapolis Star and Tribune, October 27, 1983, p. 4B; "Ownership of Burned Mill in Dispute," Minneapolis Star and Tribune, October 28, 1983, 1B; "City Council to Decide on Demolition or Preservation of Crown Roller Mill," Minneapolis Star and Tribune, October 28, 1983, p. 6B; "Compromise on Mill Saves Part for Now," Minneapolis Star and Tribune, October 29, 1983, p. 8C.

SUPPLEMENTARY DATA SECTION

# The Northwestern Miller.

The Only Weekly Milling Newspaper Published in America.

Volume 3--Number 21

MINNEAPOLIS, MINN., MAY 21, 1880.

THREE DOLLARS PER YEAR

## THE CROWN ROLLER MILL.

Full Description of Messrs. Christian  
Bro. & Co.'s New Mill, Just Started  
in This City.

It is often remarked, both in jest and earnest, that if a person resides in this city but a single week he is sure to catch the "fever" and become an enthusiastic lover of the present and future prospects of the metropolis of Minnesota as any one of its "oldest inhabitants." That the new comer should be impressed with the city's thrift and business prosperity, as well as by its lovely surroundings, is not to be wondered at when at every turn comes in view some new beauty or some new instance of the push and energy of its citizens which are fast becoming proverbial. For this steady and unexampled prosperity this city is in great measure indebted to the magnificent water power, which, although but yet partially harnessed, has made Minneapolis the foremost manufacturing point in the upper Mississippi valley. Large as have been the drains upon this power for milling and other manufacturing purposes, there still remains more than is yet needed, and every day we are called upon to chronicle the inauguration or completion of some new enterprise which is destined hereafter to contribute its full share towards the material advancement of the place. In the autumn and fall of 1878 the *Northwestern Miller* contained frequent mention of a new and mammoth enterprise which was destined to add largely to the milling interest of the city which was already regarded as the great milling center of the western world. From that time until the present we have made frequent mention of the progress of the work, and in our last issue we announced the making of the first flour in the mill. It is now both our pleasure and duty to lay before the readers of the *Northwestern Miller* a careful description of the new mill, which was since that time christened by its owners, the "Crown Roller Mills."

### THE MILLING.

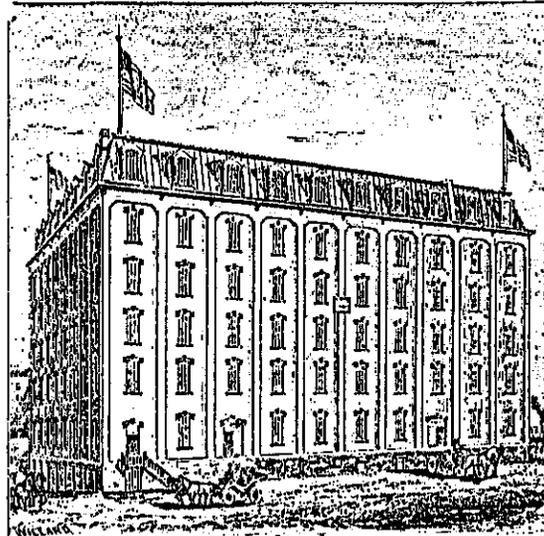
Minneapolis has long been known as the city of mills, and its cluster of mills, so near together that a person standing in the center is almost within stone's throw of the farthest one, contains more than one which in size, capacity and perfection of equipment has been the wonder of the many visitors who through the "platform," of this cluster of mills the "Crown Roller," although exceeded in size by one other, in the most conspicuous and is the first to claim the attention of the incoming stranger. This proud prominence it enjoys not less from its immense size than from its commanding position on the highest ground around the falls. The building itself is an immense fact the illustration given herewith fails to convey any adequate conception of its size. It is situated at

the corner of First St. and Fifth Ave. south, and fronts 124 feet on First St. and 145 feet on Fifth Ave. The foundation and basement walls are of native fine limestone, four feet thick, and resting on the solid limestone ledge which forms the crest of the falls of St. An-

thony. Under his guidance we first visited the

WHERE WE ARE HARVESTING.

The former is situated under the southeastern corner of the building. The water is led into the mill by a canal lined and arched over with brick. This



THE CROWN ROLLER MILL.

thony. Above these enduring foundations the massive walls of cream colored brick rise to a height of about seventy-five feet, and the whole is surmounted by a mansard roof, which forms the sixth or attic story of the mill, and makes the total height of the building over one hundred feet from the ground. The roof is of galvanized iron, and in spite of its great size the building is but most truly fireproof and gives pleasure to the beholder. The illustration, although small, gives a very fair idea of the appearance of the exterior of the mill. Some idea of its magnitude may be gained when it is known that over two million bricks were used in its construction, and that in its interior over a million and a half feet of lumber have been used. Work on the foundations was begun early in April, 1879, and the building was ready for the millwrights about six months since. During this time the building has been crowded with busy workmen, and the result of their labor can best be told by a description of the internal arrangement of the mill, which we went through on Friday last, having for our guide Mr. W. F. Gunn, the gentleman who designed and drew the plans for the mill building and arranged the plans and programme for the arrangement of the machinery and operation of the mill. The work has all been done under Mr. Gunn's personal superintendence, and "is greatly to

credit." Under his guidance we first visited the  
The former is situated under the southeastern corner of the building. The water is led into the mill by a canal lined and arched over with brick. This  
depth of the water in it is eighteen feet. The canal opens into a forebay, thirty feet square, with solid stone walls. Next to this forebay are two circular wheel pits, twelve feet in diameter and lined with brick. There are gates between the wheel pits and forebay, and between the forebay and the canal, so that the water may be shut off as desired. The wheels, only one of which is at present in position, are located twenty-four feet below the basement floor, and work under a head of thirty-two feet. The wheel which at present furnishes the power for this part of the mill which in its running order, is a 48-inch "New American," giving over 400 horse power, built by Stent, Mills & Temple, at Dayton, Ohio. This firm furnished the numerous bevel gears which transmit the power to the main line shaft. These gears are six feet in diameter and the teeth are fourteen inches face and four inches pitch. They are capable of transmitting 450 horse power. The basement is floored with concrete, and is sixteen feet high in the clear. It contains in addition to the gearing just described, the main line shaft, which is 112 feet long and tapers from seven inches down to five inches in diameter; the iron husk frames for ten run of hulins; the foundations for the line shaft pillow blocks, and the pulleys and supplementary shafts for

driving the roller mills on the floor above. Next to the pit gearing is an eight-foot pulley, over which runs a double leather belt twenty-four inches wide, which conveys power to the fourth story of the mill. Next to this is a seven-foot pulley, on which also runs a twenty-four inch double leather belt, which drives the smooth roller mills, etc., on the second floor. An eighteen-inch double leather belt running on a six-foot pulley drives twenty double corrugated roller mills on the second floor. From the further end of the line shaft, by means of a quarter-twist belt, an upright shaft is driven, which drives all the cleaning machinery on the floors above. At this end of the line shaft is a taper screw pulley, from which is driven the shaft which runs the machinery in the elevator. This pulley is arranged with a friction clutch, by which the elevator machinery can be stopped and started without interfering with the working of the mill. In the basement is also a Sturtevant fan which works the exhaust on the floors above, and the gearing for the passenger elevator, which runs from the basement to the attic. By its aid we ac-

### FIRST FLOOR.

In the northeast corner is partitioned off a large, roomy office, which is very neatly fitted up. On this floor are five run of four-foot French hulins in iron husk frames, fitted with Behm's patent exhaust, which is a safe preventive of fire or explosion originating in hulins and communicating with the rest of the mill. There are also nine double corrugated roller mills, driven from below; six flour packers and two bran packers. Eight here it may be well to state that at present only one half of this mill has been fitted with machinery. The north half will be finished as soon as the other half is satisfactorily running, when the total capacity of the mill will be increased to 2,000 to 2,500 barrels per day. At present the mill starts up with a capacity of about 1,000 barrels per day. The first story is fourteen feet high, and next to the ceiling are the line shafts for the roller mills on the floor above. On the

### SECOND STORY.

are eighteen double heavy corrugated roller mills, thirty at Duwinton's smooth four roller mills and one of the class three roller mills. The husk over all the rollers are of iron. Here are also the goppers over the stones and the husk over the flour and bran packers, and the bins in which bran and shorts are held for the retail trade.

### THE THIRD STORY.

contains three pairs of emulating stones and two wheat gauders, which prepare the wheat for them on what is known as the Potts process; two double cockle machines; four number four Smith's rollers; two aspirators, thirty-five air purifiers, two of the Best and houses, four,

Continued on Page 28.

Continued from Page 321.

etc. The lean dust catcher is a device for "straining" the air from the purifiers, and returning it to the room entirely free from dust, thus adding greatly to the cleanliness and safety of the mill. The air machines form one of the special features of this floor. Each machine makes two grades of millings, the separation being entirely effected by currents of air and by the gravity of the particles. There are also seven No. 31 Starvant exhaust fans for working the air machines, and from them branch out a perfect whirlwind of pipes, carrying and twirling in every conceivable direction.

FOURTH FLOOR.

On this floor the bolting chests high and extend up through the two floors above. There are, in all, 81 reels, each 23 inches in diameter and 12 feet long. Besides this there are ten grading reels in the attic. On the fourth floor are also three of Gray's aspirators, two Welch's separators, forty-four purifiers, two No. 4. South purifiers, three of Dean's dust catchers, besides shafting, gearing, etc. The line shaft on this floor is driven from the basement by a twenty-four inch double leather belt running over a seven foot pulley. The upright shaft to the sixth story or attic is driven from this shaft by a pair of bevel gears capable of transmitting 300 horse power. Four of Dean's dust catchers adorn this floor, and there is the necessary shafting, gearing, etc. The next or fifth floor

is filled with the bolting chests, 10 of Hugganmacher's cylindrical action purifiers, twenty-four grading rollers over the air machines below, and in the southwest corner, part of one of from the rest of the room, are two Richmond brush machines and two Richmond separators, each machine having a capacity of 125 bushels per hour. On this floor are also three of the horizontal dust catchers.

SIXTH FLOOR.

On this floor, in twenty foot high and in it are the upper parts of the bolting chests, ten grading reels, the heads of the elevators, an air purifier, another dust catcher and the necessary gearing, shafting, pulleys, etc. A circular stairway leads to the roof, from which the visitor obtains one of the finest views of the city.

The building is lighted by gas and will be heated by steam throughout, the latter being placed in a brick boiler room adjoining the main building on the south side. A stand pipe connected with the city water works extends from basement to attic, with hose attachments on each floor. On each floor are also several Babcock extinguishers, barrels of water on each floor with buckets handy by, speaking tubes and alarm wires from grinding floor, and ten skylights on each floor day and night to watch the machinery; in fact, every possible provision for securing the safety of the mill.

THE ELEVATOR.

Enclosed in the same walls, on the west side of the mill, is the elevator. It is separated from the mill proper by a brick wall which rises above the roof, and through which there is only one opening into the mill. The passage way from the mill through the elevator on the first floor is covered over with brick, so that there is no communication with the elevator except through small doors on either side of the arch, which are closed with iron doors. The peculiarity of the elevator is that the wheat is stored in

chests from bins. There are thirty of these bins, each seven and one half feet in diameter and sixty-six feet deep. The space between the bins, which are placed close together, is also used for storage bins. The total capacity of the elevator is 99,000 bushels.

The mill is owned by Messrs. John A. and Lowellyn Christian and Mr. Charles M. Hardeburg. Mr. C. E. French is associated with them in operating the mill, the firm name being Christian Bros. & Co. Messrs. J. A. & L. Christian formerly operated the old Washburn A mill, and have been prominently identified with the milling interest of Minneapolis since the introduction of the new process. This mill, as constructed, embodies the results of their long experience, and is worked on the gradual reduction or high grinding system, improved and perfected as far as American ingenuity has yet been able to go.

Mr. W. P. Hunt, who prepared the plans and superintended the erection of the mill, is entitled to much credit for the skill shown in its arrangement, and Mr. Wm. Sheer, the foreman, under whose direction the machinery was put in, is entitled to equal credit for the excellent workmanship which is everywhere visible. As stated before, the mill only starts up at half its capacity. We understand, however, that it is the intention of the owners to put the other half of the mill in shape as fast as possible. Even as it is, it is a magnificent establishment, and is a most important and valuable addition to the milling interest of Minneapolis.

British Agricultural Interests.

James Caird, the agricultural authority, in a letter on the British agricultural prospects and American competition, says: "Nothing like the present depression in agricultural interests has been seen since the repeal of the corn laws. In many years there have been seven defective harvests. In England, where the bulk of the wheat crop is grown, there has been but in three years one-fourth more than a whole year's wheat crop—a loss to the growers of more than £10,000,000 with no compensation in higher prices. The introduction of foreign wheat and cereals in all human hands to the consuming class of Europe. It must be met by the production of articles which will not bear long storage or carriage, such as milk, fresh butter, early wheat, vegetables, hay, straw, potatoes and sugar beet, grass, farm draining and market gardening. All interests in land, whether owner, occupier, or laborer, must be unshackled. The control of tenant land must be removed. The sale and transfer of land must be simplified and cheapened. Incumbent and unwieldy estates will thus be broken up and subdivided to form numerous small properties. The drain of agricultural labor and capital to the United States and Canada will alter the existing conditions of agricultural property in England. Our agriculturists must adapt itself to the changes, freely accepting the good it brings, and skillfully using the advantages which the greater proximity to the best market must always command."

Prof. A. Graham Bell has deposited with the Smithsonian Institution a model package containing an account of the first results obtained by him with an instrument he conceived two years ago, and by which light can be transmitted just as the telephone transmits sound. "Whether this means," says the Boston Herald, "that the actual sunlight, which, for instance, is shining on London or Constantinople while Boston lies steeped in the darkness of night, may be carried to the Utah for illuminating purposes, or whether it is the images of objects may be made visible at a distance does not appear.

CORRESPONDENCE.

Milling Notes From an Iowa Town.

Editor Northwestern Miller:

One of the principal towns in Clayton county, Iowa, is Guttenberg, pleasantly situated on the Mississippi river, about forty miles above Dubuque, and on the Chicago, Clinton, Dubuque & Minnesota railroad.

Guttenberg is a pleasant, lively little city of 1,000 inhabitants, and claims to be one of the richest towns in Iowa, although, considering its many advantages, it has grown but slowly, and in the past few years for some unknown reason, probably the growth of Dubuque and other cities near, it has decreased in population and business facilities. Besides the railroad, this city has a good steamboat line. The flouring and saw mills of the immense amount of shipping to various points on the river, both north and south.

West of Guttenberg and across the river in Wisconsin the fine farming lands are well adapted to raising all kinds of grain. Farmers, finding Guttenberg the best market, transport nearly all their grain to this place, Wisconsin farmers transporting in the winter. Hence, the leading industries are milling, steaming in produce, and trading in general.

To the readers of a milling journal perhaps the most important item will be the flouring mills. Although Guttenberg is not a milling town, there is but one mill of enough importance to warrant a description, that owned by Meek & Bros. It is a large stone building, three and one-half stories high and six hundred feet on the ground. The mill is run by a steam engine of two hundred horse power and grinds 125 barrels in 24 hours. Unlike many milling firms, this one does not manufacture its own barrels but buys them at a small profit for the manufacturer. It has recently placed in its mill all the improvements requisite for making the "New Process" flour, and maintains the reputation of making some of the very best quality. A strictly order business is carried on, all flour being shipped to Dubuque and Chicago. The mill is not running at present, owing to the fall state of the flour market; but better times in the grain and flour trade are anticipated and Messrs. Meek & Bros. will enjoy their full share of the business.

Besides the mill there are several of minor importance, but all useful for a considerable quantity of flour. The two miles north of the city is owned by Mr. H. E. West, also one three miles south owned by Mr. Fisher.

Mr. Zimmerman's steam saw and planing mill on the river about a quarter of a mile from the center of town gives employment to a large number of men and supplies the country around with lumber.

The town is situated comparatively high, and the inhabitants are healthy, good-natured, jolly, hard-working farmers, mostly, who have never forgotten the old country's sports and pastimes, and still have to meet in their hour-garden on Sunday and pass away the time in the usual manner of that class of people.

Crops in this section of the country are looking well. Winter wheat which was thought to be killed out by unfavorable weather in the early spring is turning out better than was expected. Spring wheat is in good condition, and we are now having pleasant weather, which is all the farmers can ask for in order to make the new crop a promising one. Yours truly, J. V. R.

Guttenberg, Iowa, May 12, 1880.

The Inutility of the Double Conveyer.

Editor Northwestern Miller:

I saw an article in the Northwestern Miller of April 22d, concerning an old patent in relation to double conveyers under roofs in bolting chests, or in the words of the patent, "a secondary short conveyer or under the first conveyer, to return a part of what is bolting out by the rolls for bolting." In order to show the absurdity

and injustice of such a claim, I will give my knowledge of the double conveyer in bolting chests.

The Empire mill, of this place, erected in the year 1846 by Mr. Denton, a millwright of Cleveland, Ohio, has two full sets of bolts with double or secondary short conveyers under each roll, for the purpose as claimed in the patent. These chests are still in use unaltered.

The Phoenix mill, built by the same person in 1848, had a four roll chest with secondary short conveyers for returning. In the same year the Kilburn mills were erected by Mr. Anderson, the foreman of Mr. Denton, and had the secondary conveyers under paper and lower rolls for returning purposes. This chest is in the mill at present without any changes.

In 1852 under the supervision of J. A. Robinson I constructed a full chest, with full length double conveyers under the rolls. The lower conveyer was placed half way under the first, and was, at that time, termed the return conveyer.

In 1851 I reconstructed the fifth ward mill which had one roll with double conveyers, one directly under the other, for cutting off and returning.

In 1851 my brother placed a two roll chest in the River street mill, with the secondary conveyers for returning purposes. The year following this mill was burned, and rebuilt by our firm in the same year, and we placed therein a chest of six 24-inch rolls, with double conveyers, for probably the purpose claimed in the patent. An illustration and description of this chest can be found in "Crown's Millers' and Millwrights' Guide," published this year after the reconstruction of this mill. I am, yours truly, G. H. Barrett.

Milwaukee, May 12.

Industrial Notes.

The product of the pottery business in the United States is worth \$4,000,000 a year.

A significant sign of the times in the progress which iron shipbuilding is making in China, a Scotch firm who began by establishing a shipyard in Shanghai, several years ago, now employ 1,000 Chinese workmen.

There is a large business in the procurement of American cotton goods by the Japanese. The Japanese government is reducing the wages of mill-labor. Five of the large mills at Huddersfield have given notice to the mill-laborers that their pay will be cut down from 5s to 4s. 6d per ton. A like reduction will be made at Huddersfield and in the mills of Lancashire. The management is creating some discontent.

It is said that there is but one establishment in this country for the manufacture of spectacles by machinery, and that is located at Bowling, Pa. The glasses are not only ground by ingenious machinery run by steam power, but the frames and all the processes needed to complete the spectacle are wrought by mechanism.

The employment of foreigners in the Japanese service is an annually decreasing number. The Japanese government is having its subjects taught in Europe in order that they may become competent to do the work which Europeans are now paid for performing. This by one foreign employes are being superseded by natives in various departments and profitable works. The Japanese are a self-helpful people, and will not keep foreigners to do what they can accomplish themselves. Japan, therefore, will soon come to be a field for the emigration of advanced foreigners.

Augusta, Ga., has six cotton factories in operation, and in the course of building, and capital is being raised for still another, the first two having 21,000 spindles and to cost \$200,000. The six factories used last year 4,000,000 bales of cotton, their products being worth \$3,000,000. Cotton mill stocks are quoted very high. Last year the mills paid 12 to 12 per cent dividends, and put away handsome sums in their sinking funds for extension. This new 24,000 spindle factory will add to the population of the city at least 5000 souls, and will pay to employees \$175,000 annually. These mills make, besides what they consume, a market for 175,000 bales of cotton, which requires \$4,000,000 annually to handle.

A terrible incident from Millport, Pa., is reported from the Indiana district of Pittsburg. At the moment of his arrest a young nobleman was struck by his own father. The father then shot himself.