NPS Form 10-900-b
(Revised March 1992)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

cover

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting multiple property groups relating to one of several historic contexts. See instructions in *How to Complete the Multiple Property Documentation For* (National Register Bulletin 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items.

X New Submission _____ Amended Submission

A. Name of Multiple Property Listing

Flour Milling and Related Buildings and Structures in Iowa, 1840-1940

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

Flour Milling in Iowa, 1840-1940

C. Form Prepared By

name/title Lowell J. Soike, Ph.D., Historian

organization State Historical Society of Iowa date 2/16/1989

street & number 600 E. Locust telephone (515) 281-3306

city or town Des Moines state Iowa zip code 51309-0290

D. Certification

As the designated authority under the National Historic Preservation Act Of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. (☐ See continuation sheet for additional comments.)

Patricia Questkorn SHPO 2-21-00

Signature and title of certifying official Date

State or Federal agency and bureau American Indian Tribe

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Linda McClelland 3/29/2000

Signature of the Keeper Date of Action

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and the title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Fill in page numbers for each section in the space below.

E. Statement of Historic Contexts
(If more than one historic context is documented, present them in sequential order.)

F. Associated Property Types
(Provide description, significance, and registration requirements.)

G. Geographical Data

H. Summary of Identification and Evaluation Methods
(Discuss the methods used in developing the multiple property listing.)

I. Major Bibliographical References
(List major written works and primary location of additional documentation: State) Historic Preservation Office, other State agency, Federal agency, local government, university, or other, specifying repository.)

Primary location of additional data:

- [X] State Historic Preservation Office
- [ ] Other State agency
- [ ] Federal agency
- [ ] Local government
- [ ] University
- [ ] Other

J. Other Information
(Present other information on certification or topics not covered elsewhere.)

Iowa's flour milling industry rose and declined during precisely the period when the processing of milling and the location of primary milling activity were undergoing great change. The activities of Iowa millers consequently well illustrates the changing conditions of agriculture in Iowa as well as the revolution in milling techniques and flour marketing that transformed the industry.

Today, Iowa's small milling establishments are gone, displaced by large consolidated firms situated elsewhere in closer proximity to the present wheat growing areas. Milling proved to be a rapidly changing and increasingly complex enterprise against which Iowa millers struggled, and until the 1890's prospered, before being gradually overcome by conditions of declining Iowa wheat production, discriminatory railroad rates, changing American eating habits, and unstable nature of the industry itself. Beset by all this and more, hundreds of Iowa mills nevertheless survived as late as the First World War, and a few still operate today.

The Mill's Place in Iowa's Past

It is difficult for modern Iowans to form an accurate picture of the mill and the community it served. Our former city and country mills stand not only as monuments of the technical progress of an age that later improvements made worthless, but as pivotal reminders of the way that early community builders across the state envisioned their chances for development. The gristmill, being the first hint of capital to be employed in community manufacturers, held more than ordinary importance. The editor of the *Cedar Rapids Times* saw the gristmill's significance to town building this way in 1856:

> One good flouring-mill is worth more to any village than all the county seats in Iowa. The county business calls men to a town for the transaction of a peculiar class of business, which usually leaves them with little disposition, and often times with less ability, to purchase their family supplies. A commercial and manufacturing town, on the contrary, draws such funds into the legitimate channels of trade, and deposits wealth, and that, in turn, gives influence and power. Courthouses and jails are but the monuments of man's depravity, while the hum of machinery is the unmistakable voice of progress, and aids the dawn of that period when all shall win their supply by honest toil, and plenty smile at all firesides" (Parker, 1856:121).

Consequently, it was common to see Iowa towns offering "bonuses" to secure a flouring mill. They recognized the extent that having one would draw other trade from their farming neighbors. "The benefit to the town would be great," wrote Sheldon's local editor as he urged subscribers to raise the needed mill inducement bonus. This is because "with the Sheldon Mill in operation, our merchants would notice a material increase in trade. In fact there is no kind of business it would not help. (*Sheldon News*, Dec. 6, 1883).

With the possible exception of the storekeeper and grain dealer, the miller stood in closest business relationship to the farmer. Our nostalgic prose and poetry notwithstanding—whereby we read of an easy going, dusty capped, rotund "Jolly Miller" cheerfully greeting the farmer at the mill door—farmers more often met a man as muscular and active as themselves and ready to strike a deal. The business transactions found the farmer and miller often at odds, disagreeing about the weight and quality of the wheat brought in and of the flour ground.

Until the 1870's in towns and even later at more remote country mills, the farmer traveled to the mill early in the morning with no assurance that he would return at night. On his journey there, he would ply oncoming travelers with the question "Is the mill a runnin'?" "And quite often," as one Iowa pioneer related, the farmer had to head back home after hearing the response of "Creek too high," "Creek to low," "Froze up," "Shaft broke" or other discouraging news." When the answer was "She's runnin'," the farmer continued on his way and joined the throng of others waiting there. "With opportunities for congregating being few, the mill became the place, above all others, for public intercourse among the settlers" (Duffield, 1904:435). When his "turn" came up, the farmer's wheat would be ground into flour with a portion of the grist paid to the miller as a "toll". In the process the miller might complain of straw, sticks and dirt in the wheat while the farmer voiced his complaints of the grind being insufficient or poor.

After the arrival of roller system milling, with its lengthy gradual reduction process that produced more uniform flour and separated it out into various grades, a new grist system came into being based not on "toll" but "exchange". As described in 1879 by the editor of the *West Point [Iowa] Appeal*, " a man takes his grist to the mill, it is weighed and he receives in exchange an article of flour which is warranted to him the same as though he had purchased it for cash at the stores. The transaction occupies about five minutes, often less, and he drives home in a far better humor with himself, the miller and the world generally than if he had passed the day in idly waiting for his grist" (*United States Miller*, 1879:74).

The village miller, by virtue of his position as a man versed in techniques of manufacture and larger scale trading within and outside his community, often gained considerable respect and influence in community affairs. If of a progressive spirit—keeping abreast of the times in milling and in his locality—the miller wielded great local influence. "He becomes one of those who are consulted on all matters relating to everyday affairs in business matters and about business forms" wrote R. Kemp Welch in 1903. "His judgment:

> Is appealed to by one side of the public question at issue; and being familiar with all farm details; such as plowing, seeding and harvesting, those conditions are all submitted to his judgment. With his moderate knowledge of things mechanical, he is asked to pass judgment on the latest improvements of the various machines brought into the neighborhood. In legal matters he ranks with the justice of the peace, and he must submit his opinion on the latest horse theft of barn burning. . . . He is also supposed to be a reliable statistician and able to state the yield of the last year's crops and also verify each claim for superiority of the various kinds of grain.

And, as one of the "controlling spirits" in local affairs, the miller found his advice "constantly sought by the leading county politicians" (*American Miller*, 1903:319-319).

Wherever the mill dominated the industrial activity of small Iowa cities and towns, other commercial services such as banks, stores and hotels tended to orient themselves in size and activities to complement the mill's trade. Accordingly they suffered greatly when the abandonment of wheat growing and the centralization of the flouring industry displaced hundreds of small town Iowa mills whose owners decided not to invest yet another fortune in updating their flour mill to modern milling standards.

This decline in mill business placed heavy burdens on towns. As the mill's trade steadily dropped away, notes at the bank became due, which could not be paid, so, finally, the bank was compelled to take the mill, which was more of a burden than its small capital and now decreasing deposits could stand. A bank reorganization followed, but this prolonged its life for only a short time, for the mill was still on its hands. With the mill now compelled to close, the town suffered, especially if it numbered among those that had financed paving projects, new schoolhouses or public utilities with bonds in the expectation of continued prosperity and property values. In neighborhoods where the old mill continued on after it had outlived its generation, the farmers sold their grain to and bought their bag flour from the store-keeper, while the old-style miller had the satisfaction of grinding their feed (Pickett & Vaile, 1933:63-64).

More often the mill ceased operations and the building suffered stages of dilapidation before finally being removed. Of those few that survived (mainly in towns), its milling origins often disappeared in the process of taking on later commercial or warehouse identities. Before all traces of this important and once flourishing industry are lost, such mills need to be identified and, where possible, listed in the National Register of Historic Places so that their place in the history of Iowa's development is recognized. The discussion that follows is intended to help engage Iowans' interest in what survives from this industrial past that they see about them. By calling attention to the story of Iowa milling, we will help foster a better understanding of, and hopefully some appreciation for, a significant part of the state's early agriculture and industrial development. In particular we want to offer encouragement to those trying to preserve what survives from this bygone era.

Throughout the story of Iowa milling, five influences have predominated: the westward movement of wheat raising, changing mill power arrangements, the introduction of new milling processes, concentration on milling and the shifting preeminence of milling cities in the competition for markets, and transportation advantages and freight rates. By

understanding these lines of development as they relate to Iowa, one better grasps the character of events and their timing that shaped the prevalence, distribution, size and overall trend of milling in this state.

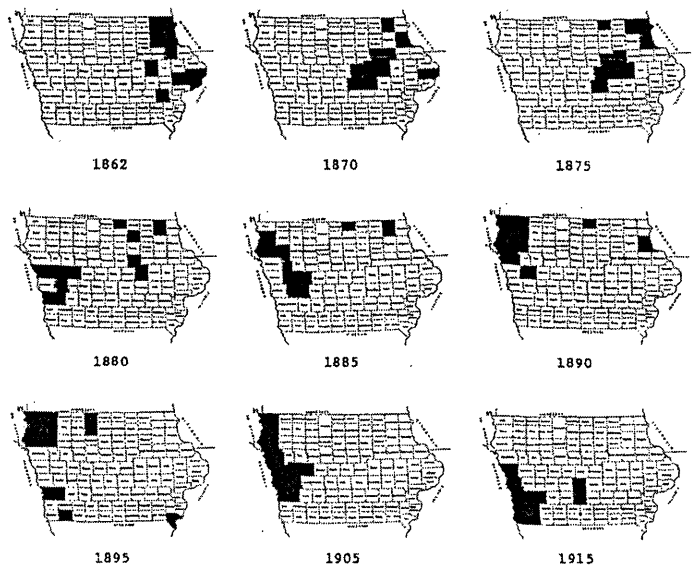
Rise to Prominence, 1840-1870

The rush of settlers into Iowa and the western territories brought wheat raising into the Mississippi Valley. By 1859, Iowa had advanced to become the seventh leading wheat producing state (Schmidt, 1920:401). Demand for gristmills exceeded the number available, however, owing to want of sufficient capital and milling skills. "It is the lack of facilities for the manufacture of flour," grumbled a Muscatine editor in 1843, that mainly explain why local wheat is "about half the price it commands in Ohio, while the price of flour is about the same" (Bloomington Herald, May 19, 1843). In his view, "situated as our country is at present," the absence of capital accumulation and investment in local mills would only assure that "the St. Louis merchant can purchase our wheat, ship it down to their mills, manufacture it, and reship it to us at which our country flour is sold." By the 1850's, however, importation of flour was declining as nearly every town along the river erected a mill (Mahoney, 1982:212).

Figure 1

TEN LEADING WHEAT PRODUCING COUNTIES IN IOWA, 1862-1915

(Number of Bushels Harvested)



Source: Published volumes of the Census of Iowa, 1862-1925.

During these years, as figure 1 indicates, Iowa farmers living in the Mississippi River counties led in producing wheat. Gradually this eastern Iowa wheat district shifted to the northeastern and northern counties and then westward as the number of mills increased accordingly in these sections. Lee, Scott and Jackson counties, which led in wheat raising during the fifties gave way to Clayton, Allamakee and Winneshiek counties by the end of the sixties. Mill construction followed suit. The consequences could be seen in the 1880 Federal Census, which indicated that seven counties in the state contained twenty or more mills and all of them save Linn County lay within northeastern Iowa. These included the counties of Allamakee (22 mills), Clayton (20 mills), Clinton (21 mills), Dubuque (23 mills), Fayette (20 mills), Jackson

(20 mills), and Linn (21 mills). Together this cluster of seven counties contained 21 percent of Iowa's total mills. By 1880, however, the days of such mills in northeast Iowa were numbered. Wheat raising had moved further to the western counties. Whereas in 1860 these seven northeastern counties had accounted for 29 percent of the wheat produced in Iowa, by 1880 farmers living there grew but 9 percent of the state's wheat (Bogue, 1968:219-220; Swisher, 1940:291-292).

These were the final decades of an age when water rather than steam powered the mills that ground the wheat. Even as late as 1870, steam provided only two sevenths of the power used in the nations' flour milling (Storck & Teague, 1952:180; Steen, 1963:39). A few strictly steam operated mills could be found about the state during the 1850's and 1860's (e.g., mills in the Mississippi River towns of Dubuque, Rockingham, Davenport and Muscatine), but they were exceptions to the rule. Instead, most would-be Iowa millers searched out a stream in the wheat growing areas that could provide sufficient motive power during much of the year to run the wheat grinding machinery while, in the case of some, using a steam engine as auxiliary back-up power. The miller would then grow together a brush or crib dam for backing the water upstream in order to form a millpond (Fig. 2).

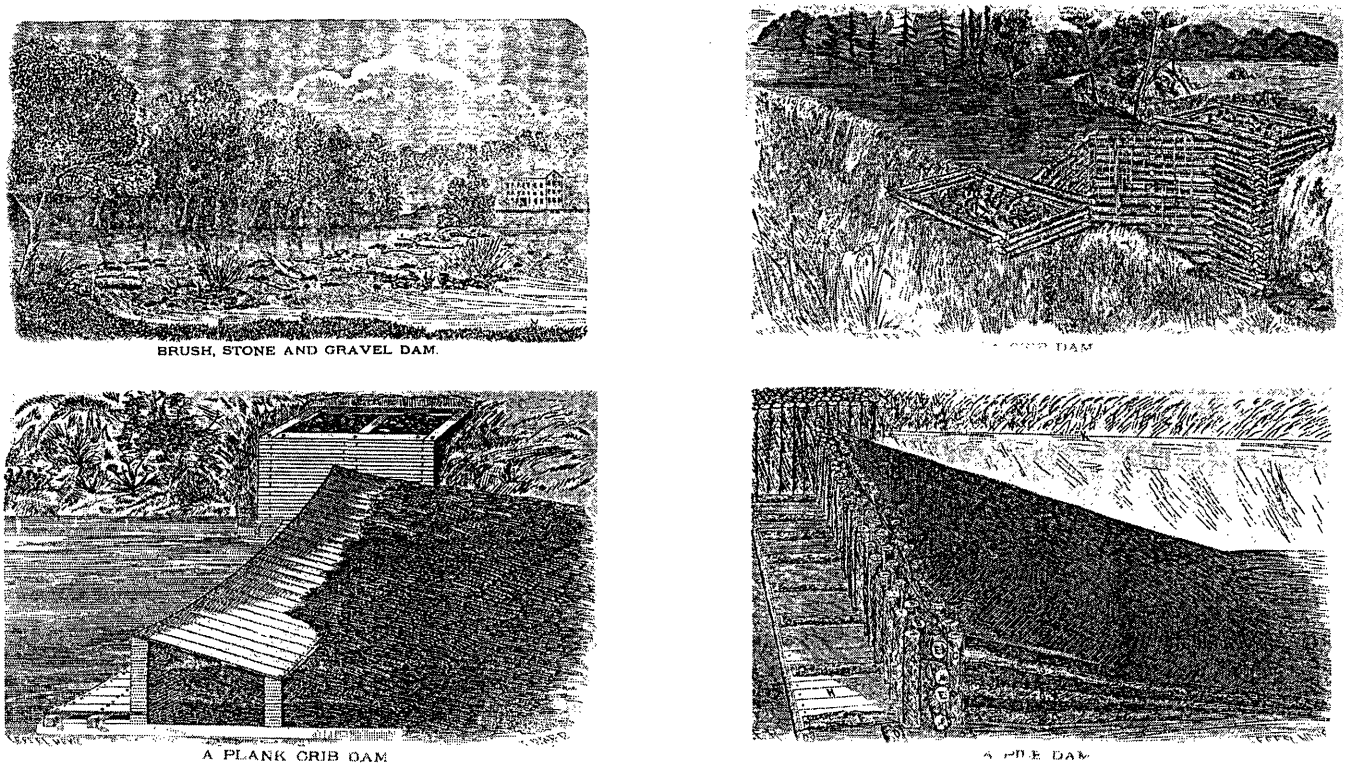


Fig. 2 Some mill dams commonly used in the days before concrete construction. (James Leffel & Co. The Construction of Mill Dams . . . . [Springfield, OH, 1874], pp. 46, 58, 72, 93.

This delivered waterpower down a millrace to the styles of wheels in use at that time. These comprised mostly tub, breast, and under-and-over shot wheels, the stock-pattern (American mixed-flow) turbine not coming into general use until the 1860's as the simplest available means for meeting the growth needs of mills (Hunter, 1979:343-347, 415). Water supplied its power either by its weight falling against traditional water wheels or by its pressure exerting force on the wheel blades or buckets of a turbine as it pushed to exit.

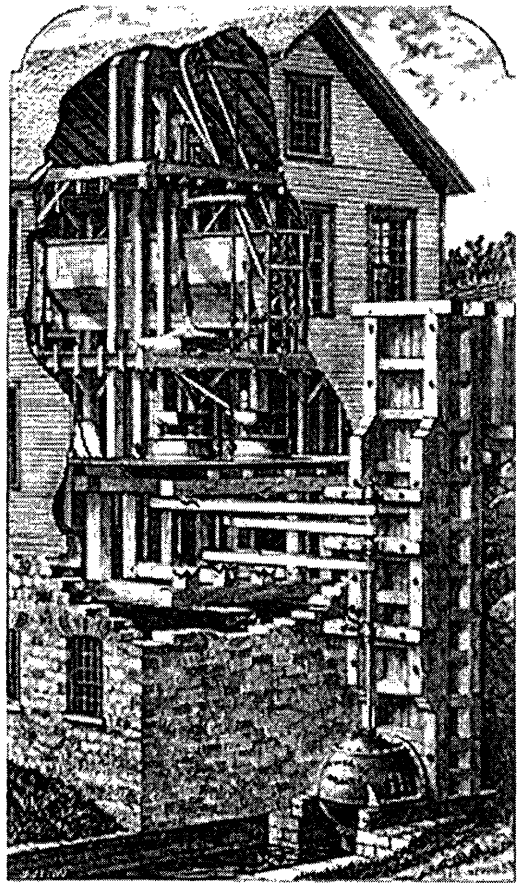


Fig. 3 Superior efficiency, all-season usefulness, and low cost led the American mixed-flow type turbine (which channeled water inward and then downward) to displace the traditional overshot wheel and others. Illustrated here is the method of transmitting power from the turbine to run two millstones. ("Leffel Turbine Wheel Driving a Two-Run Flouring Mill," *United States Miller*, 16(January 1884), 37)

By the 1870's Iowa millers, seeing the declining cost, superior efficiency and greater lifespan of the turbine, rapidly replaced their waterwheels with one or another variety of the manufactured iron turbine (Fig. 3). The old water wheel virtually disappeared form the state. As might be expected during this era when the principal area of wheat raising coincided with where water power was to be found, water driven mills proliferated on the streams and rivers of eastern, especially northeastern, Iowa.

Milling processes during this time were essentially those of the automatic American mill of the early nineteenth century as had been developed by Oliver Evans (Fig. 4). His mechanical improvements had incorporated various devices to lift and move grain in order to take advantage of gravity over hand carried methods. The incoming wheat—first elevated to the top of the mill building—passed through screens for cleaning before proceeding down through a set of millstones, where it received a "close" one-time grinding. The resulting hot and damp meal was elevated once more for cooling in

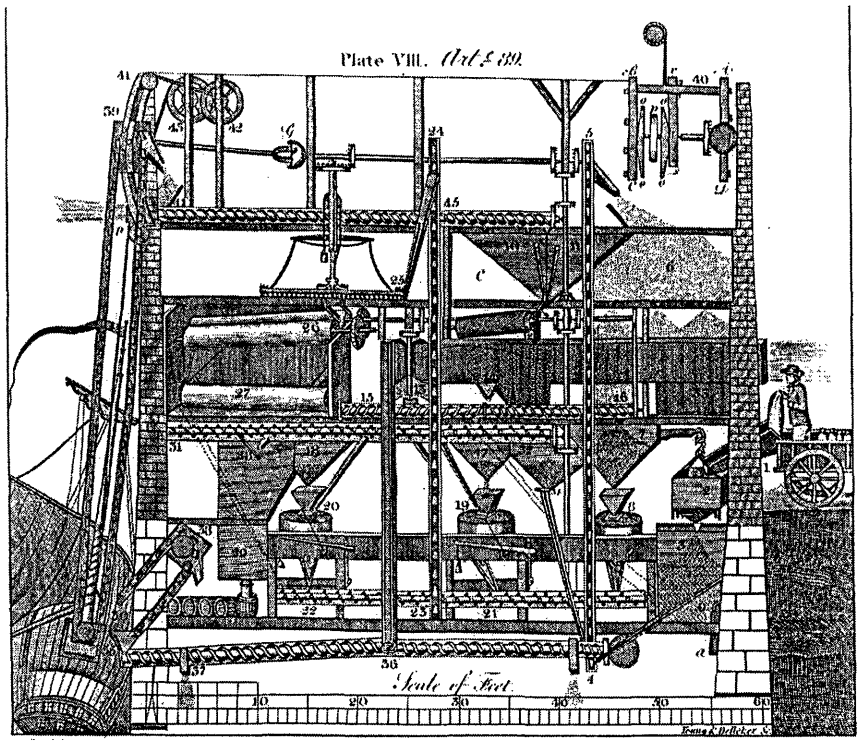


Fig. 4 Oliver Evans' Automatic Mill of 1791. This picture has often been reproduced, but only in his own "Young Millwright and Millers' Guide" is the complete description given. The leading features are: 1-Wagons emptying grain into scale pan. 2-Scale pan to weigh the grain. 3-Small garner and wind chest for cleaning wheat. 4. 5-Elevator to top floor of mill. 6-Main store for wheat. 7-Garner feeding the shelling or rubbing stones. 8-Rubbing stones. 9-Grain is again elevated and deposited in garners. 10. 11. 12-Rolling screen. 13-Fan for cleaning grain. 15. 16-Conveyor to garners. 17. 18. 19. 20 (also 8)-Buhr stones. 21-Conveyor collecting meal after it is ground. 23. 24-Elevator to hopper-boy. 25-Hopper-boy, which spreads and cools the meal and supplies the bolting chest. 26. 27-Bolting reels. 28-Chest containing super fine flour. 29-Spout for filling barrels. 30-Vessel to be loaded. 31-Conveyor for middlings. 32-Screenings garner. 33-Chaff room. 34-Gate valve for screening s to be cleaned. 35. 39-Elevator for unloading ships. This rises and falls in the curved slots and is driven by universal coupling at "G." 38-Temporary elevator for short lifts. 41. 42 and 43-Part of mechanism for hoisting elevator clear of the ship.
(Young Mill-Wright and Miller's Guide. [Philadelphia, 13th ed., 1850])

a hopper-boy, from where it proceeded downward once again through a long slowly rotating silk-lined bolter. This acted as a sifter to separate out the various parts of the ground wheat into its products (e.g., flour, middlings, and bran). The middlings, or coarse particles from the flour-yielding portion of the grain mixed with bit of bran, were commonly reground with the next batch of wheat (Storck & Teague, 1952:160-166, 188-189). Thus, prior to 1870, all the early to mid-nineteenth century improvements that had been made to milling were to be found in Iowa mills, namely, the elevator, the conveyor, and silk of various weave sizes for "bolting" or sifting the ground flour into differing grades of fineness (Fairchild, 1927:195). This problem of separating out the flour from the rest proved especially difficult with "hard wheat" varieties. Hard Spring wheat predominated in the rising grain empire of Iowa and the Middle West. Important advances would occur in the 1870's as American millers brought forth devices for reducing the hard wheats to improve the yield of quality flour.

Milling centers rose and fell from importance as they became favored receiving points for grain during a period of years. This happened when a milling center pursued its advantageous proximity to existing wheat growing districts, transportation connections and to markets for flour sales or export. When the railroad's arrival ended the days of high freight rates from river and road transport, new opportunities opened to concentrate milling at particular locations. Most Iowa millers to 1870, however, continued to operate largely as a local gristing business, doing custom milling for farmers and residents in their locality without having to greatly fear the competition of flour coming in from distant

mills. During the period of river commerce Saint Louis stood as the preeminent milling center, having displaced Rochester, New York as the flour-making center of the world. St. Louis held that position during the years when the westward movement of grain growing joined together with a river transport based economy. Iowa millers-especially in southeastern counties - mainly felt the competitive influence of huge St. Louis milling interests during years when low grain supplies extended the city's reach northward and consequently bid up the price for wheat. By the later 1870's,.however, St. Louis was yielding its supremacy to Minneapolis. Now it was the millers in Iowa's northern counties that began to feel competition in selling their flour as their flour as their Minneapolis brethren sought to take advantage of cheap railroad rates to widen the market area for the flour of their ever increasing capacity mills (Alsberg, 1928:274; Kuhlman, 1929:83-88, 125-131).

Transportation advantages made a big difference. Rail connections were few during this early period and most mills relied on water rather than steam power. The situation favored the existence of many small custom mills at points along a stream or river to which farmers in each locality drove their wheat by wagon to the miller's door. In this era or road and river transport, the local miller had little need to worry about others competing for the farmer's wheat in his vicinity. Only during rare times when low wheat supplies at larger milling points such as Dubuque, Davenport, or Muscatine forced prices upward did farmers make the extra long trip with his wheat. By 1870, however, new conditions were eroding away at this common practice. A more tightly woven system of economical rail connections (and grain elevator systems) joined localities to the developing international trade in wheat and flour. This gave the miller greater competition for the farmers' wheat but also greater opportunity to find elsewhere the particular sort of wheat he wanted in order to improve the quality of his own flour output, thus developing the miller's art and skill in blending wheats. Likewise, the new nearby railroad linkages made other markets accessible to the farmer for selling his wheat beyond that of his local miller (Alsberg, 1928: 274).

Prosperous Times and Rising Competition, 1870-1895

"It is hard to appreciate now," observed one writer fifty years later, "that Iowa was, in 1873, the largest wheat-producing state, followed by Illinois, Minnesota, and Wisconsin. These four states produced more than two-fifths of the entire wheat crop of that year" (Thorndyke, 1922:274).

These were the good years for most Iowa millers. With wheat prices being generally low - a matter of consternation to Iowa grain farmers—and the development of new milling processes boosting both flour yields and prices received for flour made from hard Spring Wheat, the number of Iowa mills proliferated. Some dislocations began occurring in the older areas of Iowa's flour milling industry as the center of wheat raising moved toward the northwestern counties. This placed abundant wheat supplies at a distance from the earlier established mills in eastern and northeastern Iowa. Moreover, the low wheat prices—while in the short run aiding miller's profit margins—further reduced the miller's wheat supplies because more farmers abandoned wheat raising. By 1890, the lower supply of wheat was clearly evident to northeastern Iowa millers. Local farmers devoted less than two percent of their improved acreage to growing wheat while farmers in the northwest counties were planting over ten percent of their improved land in wheat.

Hard spring wheat had come to dominate soft winter wheat varieties being grown by Iowa farmers. During the late 1840's Iowa farmers began solving their problems of poor soft-winter wheat harvests by making the shift to raising hard spring wheat (Bogue, 1968:125-128). By the 1870's winter wheat comprised less than one out of every four-four bushels grown there and Iowa had risen to national leadership.

Spring wheat raising had proved a mixed blessing for farmer and miller alike, however. Hard spring wheat ordinarily sold at a discount because it was not prized by millers as good milled wheat. The miller, using a one-step grinding process with millstones, found it difficult to extract flour from the tough outer coating of hard spring wheat without shattering its bran covering into flakes too small to be easily sifted out. Also the center portion of spring wheat did not readily yield up its flour, instead tending to break into small floury particles called "middlings." Within only a very few years, however, this state of affairs had entirely reversed itself. Hard wheats, instead of being discounted, drew premium prices by the decade's end. The answer lay in the arrival of revolutionary milling processes and they could not have come at a more propitious time for Iowa millers.

The "revolution" came in two phases. The first, known as New Process milling, commenced with the introduction of a device called the "middlings purifier" in the early 1870's. After its appearance, millers found it more profitable to make larger amounts of middlings and less flour in the first grinding. To do this, they slowed down the turning speed of the millstones, smoothed their surfaces, and, instead of attempting to grind out so much, set up the height to just break the wheat berry into larger pieces. These, when fed through the middlings purifier, became transported along a sloping, vibrating sieve through which blasts of air from below and suction from above drew away the bits of light free bran while the heavier particles passed onward and out at the end of the machine. The purified middlings, called tailings, now proceeded to be reduced to white flour by being reground through a set of millstones set slightly closer together. This extraordinary "new process" not only increased the yield in flour, the price materially advanced for what was now called "patent spring" flour (named after the patented purifier process). As flour from hard spring wheat rose to the position of highest quality, its price doubled from that commanded formerly by "middlings flour". By 1876 the New Process was in full swing as millers in Iowa and other northwestern spring wheat states busily converted over their milling systems (Frame, 1980:40-59; Storck & Teague, 1952:211-222; Kuhlman, 1929:115-119).

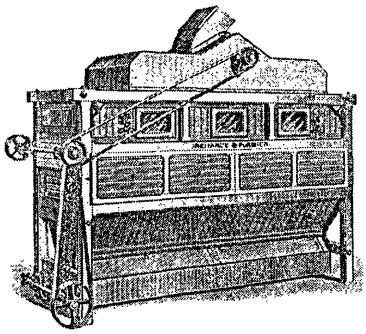
No sooner were spring wheat millers seeing the value of the middlings purifier than a second phase of the revolution began (fig.5). The traditional millstone system of grinding gave way to the roller-mill system of gradual reduction whereby wheat passed through several pairs of facing rollers, working in conjunction with using purifiers, sifters, cleaners, dust collectors along each step of the way, to break and gradually reduce the grain to flour. W. D. Gray, an engineer with the firm of Edward P. Allis & Company who had already acquired a reputation as a genius in mill construction, adapted and perfected roller processes then in use in Europe—especially Hungary. He created a reliable roller machine that could be mass produced (e. g., placing the roller mill in a heavy cast iron mounting) and replaced the noisy and high maintenance spur gear system then in use with a belt drive. Gray built in 1878 the first complete roller mill for C. C. Washburn in Minneapolis. By 188, after the corrugated roll was added to handle the first breaking of the wheat, it was apparent that the roller system would supplant stones for grinding wheat. Roller mill machines "required less space, less power to operate, [and] less oversight." Its popularity soared and within but fifteen years, scarcely a mill could be found that did not have a roller mill. The controversy among millers shifted from millstones versus roller milling to "long system" versus "short system milling where advocates argued over how many times to gradually reduce the wheat through grinding and sifting processes in order to extract the most and best grades of flour at the least cost.

The new technical developments (including the introduction of the plansifter in the 1890's) enthused but also worried Iowa millers. The initial excitement to lengthen the number of breaks and reductions" seemed to show no stopping place for the small miller except to enlarge his mill" (Thorndike, 1922:480). The ever more elaborate systems coming on the scene scared many a small Iowa miller with small means. A Marion County miller described in 1903 the magnitude of the problem having been faced by Iowa's country mills:

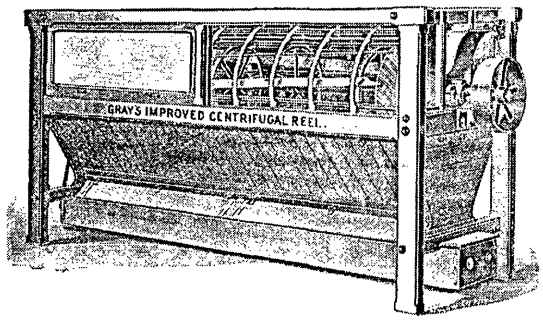
> "The mill that I bought was a burr mill with two 4-foot run of stones and a little machine they called a purifier. We at once bought a Silver Creek Purifier with a reel attachment, costing us $500. We operated about three years, during which time I made off the mill enough to pay the $5,000 debt I had incurred and to pay for all the improvements we made; and we had besides a good stock on hand and money enough to operate on.
>
> About this time the railroad came in, causing an advance in the price of wheat and a fall in that of flour. But we were still able to operate for about four years. Then we were forced to change over to the roller system at a cost of about $5,000. We continued to operate our mill at some profit, but on account of so much flour being shipped in on us and the cost of the new and improved machinery we were forced to put in, our profits were getting smaller every year. We were again forced to enlarge our mill building and to increase our capacity by remodeling our mill and putting in the Plansifter and air belt purifiers at a cost of another $5,000, this last improvement having been made in 1892.
>
> "In 1893, 1894 and 1895 we had fine crops of wheat; and by this time the eighteen mills that were in operation in our county in 1874 had shrunk to six, and our near competitors had all gotten out of the way; consequently we had a good run for about five years, enabling us to again come out on top. Then a new trouble came up. Our wheat crops of 1898 and 1899 were almost entire failures, and we began to suffer from the advance in

transportation charges, it costing us as much to ship in 100 pounds of wheat as it costs the grocer to ship in 100 pounds of flour. This is the present condition of affairs..." (*American Miller,* 1902:641).

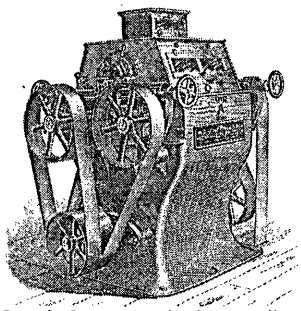
It especially worried owners of smaller older mill operations in northeastern and eastern Iowa. They faced the gloomy prospect of shipping in wheat as their local sources of wheat disappeared and hesitated to gut out and build anew their mill in order to remain competitive.



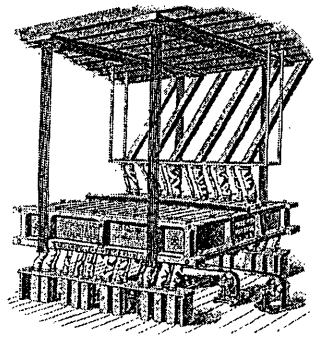
Reliance Purifier
E. P. Allis & Co.



Gray's Centrifugal Reel
E. P. Allis & Co.



Gray's Patent Noiseless Roller Mill
E. P. Allis & Co.



Plansifter
Barnard & Leas Mfg. Co.

Fig 5. The major kinds of New Process and Roller Mill Machinery during the period 1872-1895 that accomplished the "milling revolution". (Allis equipment views from *F.M. No. 36 Catalog of Flour Mill Machinery and Supplies Manutacture*), (Milwaukee: Meisenheimer Printing Co., undated). View of Plansifter from Barnard & Lea advertisement in Weekly Northwestern Miller, Catalogue of Flour Mill Machinery and Supplies, [ca. 1985].

Those who immediately renovated their operation benefited most from the advancing spring wheat prices and rising demand for the now-favored "patent" flour. As for the many small custom millers in the older regions who held back, acquiring the new machines incrementally - squeezing them into his old mill building with its increasingly complex system - they benefited little or not at all from their investments. Other old-time millers, seeing the home territory for their flour vanishing a the great modern mills shoved their high grade flours under the local mill's nose, concluded that death was only a matter of time and saved themselves the cost of enlarging and refurbishing their mill. Abandoned mills soon dotted Iowa's older rural countryside.

Most established mills between 1870 and 1900, however, did make one technical change: owners adopted steam power to improve provide more reliable and predictable the reliability and output of their power sources. While established mills with sufficient and constant waterpower installed one or more of the stock pattern American mixed-flow turbines, greater numbers now turned to steam to run their increasingly complex operation. The Miller's

flow turbines, greater numbers now turned to steam to run their increasingly complex operation. The Miller's Exposition of 1880 demonstrated superior quality and efficiency of Corliss engines and, after that, manufacturing firms began turning out types of Corliss, compound and condensing engines of a high class suitable for small mills. Before this time, the method of using steam for power had been crude, the old slide-valve engine-in one miller's words – "stealing money out of their pockets by exhausting twice as much steam as is necessary to drive the mill" (Miller, 1911:748). In earlier years when fuel was cheap, efficiency of less concern, fire and explosion hazards dissuading, and the burdens of attending to the needs of the boiler room and engine unfamiliar, millers relied on the widespread, familiar, low-cost waterpower. They used steam engines sparingly to make the mill machinery go during times when water ran low in the pond. But during the last decades of the nineteenth century, as the placing of more machinery increasingly put mills into the class of having outgrown the capacity of the streams where they were located, steam power moved sharply ahead of waterpower as a percentage of total power used. In Iowa, steam engines provided greater proportions of power driving the new mills being erected in the northwestern wheat counties during the profitable milling years after the mid-1870's (Hunter, 1975:172-173, 1979:343-346, 514-528; Miller, 1911:748; *United States Miller*, Nov. 1884).

If Iowa millers reeled from the introduction of the new milling processes, they also had to defend themselves against the ascendancy of Minneapolis as the nation's great milling center. Indeed 1870-1900 was the Minneapolis era of milling. Its regional shadow cast across the principal wheat growing and milling parts of Iowa. Minneapolis had abundant waterpower from the Mississippi River and was in close proximity to the excellent spring wheat growing area from where railroad routes carried the region's wheat to the city (helped by discriminatory cheap freight rates). Minneapolis millers also took full advantage of the economies that could be realized here by building larger and more efficient mills and investing heavily in the costlier machinery required by the new roller milling process. Not only that, the increasing concentration of population in large cities encouraged large merchant (i.e., commercial flour producing) mills at the expense of the small local mill. While the country miller mostly dealt directly with his neighbors and entrusted the marketing of his surplus flour to commission jobbers at city flour markets, the big mills could more advantageously buy and grind the wheat and ship the flour in profitable volumes to the large consuming centers (Alsberg, 1928: 274; Kuhlmann, 1929:126-130, 153-154; Steen, 1963:54-55).

Struggling in a New Era, 1900-1940

Through the 1890's many Iowa mills prospered, mainly in the western counties. Even there, however, a western Iowa miller complained of trouble because "the northern mills commenced to make inroads on their trade by reasons of the unfair and unbusiness like rebates they received from the railroad companies" (Durst, 1913:8). That was not all, however. Iowa mills felt the impact of several shifts in the industry that dislocated old patterns and unhinged many a smaller miller from his local trade. In particular, the state's millers found Iowa farmers raising less and less wheat and felt the effects from increasing concentration of milling in ever larger milling plants with their advertised brands, and from the ascent of Kansas City to regional leadership as Minneapolis went into relative eclipse as a milling center. Such trends were not so easy for Iowa millers to perceive at the time as they attempted to sort out what were short term events from the long-term changes and decide where and how best to invest their time and money. The ensuing four decades would see high mortality among mills as the large firms competitively smothered multitudes of country mills.

Perhaps most perplexing to the states' millers was the shifting area of wheat raising along with the decline of wheat raising generally. As the accompanying maps in Figure 1 show, the center of Iowa wheat production had shifted into the southwestern counties. This reflects the switch to hard winter wheat raising and the proximity of this section to the rising regional dominance of Kansas City as the milling center for hard winter wheat. What the maps fail to reveal, however, is that the amount of wheat being raised in Iowa had slipped into precipitous decline. Rather, we see in Table I that the sum total of wheat grown in 1905 no longer amounted to but one-seventh of that of 1875. Even when high wartime prices for wheat prompted farmers to briefly revive their wheat production, we see that the 1915 total amounted to scarcely more than one-third of the 1875 figure. By 1925 wheat occupied only one percent of the farmer's cropland. With corn turning out to be a more valuable crop generally and with farmers' tending to leave the corn standing through autumn instead of cutting it for silage as did many eastern Iowa, western Iowa farmers attached little value to sowing their corn land with winter wheat in the fall (Holmes, 1929:126-128).

Major shifts in the preeminence of milling cities sapped the ability of Iowa millers to compete and increasingly relegated the state to the status of a wheat-milling backwater. In general, the Northwest spring wheat section with its nucleus at Minneapolis yielded in output by 1921 to the Southwest hard red turkey wheat section with Kansas City as its chief milling point. And by 1930 Minneapolis lost its first place position as a milling city to Buffalo. Of the many causes for Minneapolis losing its competitive edge, three stand out: spring wheat production declined in quality and yield; demand dropped for high quality spring wheat flours as home bread baking declined while large scale bakery use increased; and when Buffalo obtained advantageous freight rates on Great Lakes shipments combined with the milling-in-bond privilege (permitting spring wheat flour to be manufactured more cheaply from Canadian than domestic wheat) it captured most of the eastern and export markets. Seeing their position deteriorate, Minneapolis milling firms reacted by buying or opening mills in the winter wheat districts to secure winter wheat supplies for mixing and flour blending and by building or buying out mills in Buffalo. In fact, Buffalo milling owed its expansion "almost solely" to "the migration of Minneapolis milling companies to that city," which owned 86 percent of the city's milling capacity by 1930 (Kuhlman: 216; Pickett & Vaile, 1933:16). Meanwhile, Minnesota's milling volume dropped by more than 30 percent between 1900 and 1930 (Pickette & Vaile, 1933:64). Conversely, the area of hard winter wheat raising steadily increased and Kansas City mills benefited accordingly. The city's close proximity to southwestern Iowa mills and the heavy advertising of the merits of Kansas wheat greatly threatened their small operations and they steadily lost ground (Kuhlman, 196-225: Pickett & Vaile, 16-23, 30).

TABLE I

WHEAT IN IOWA

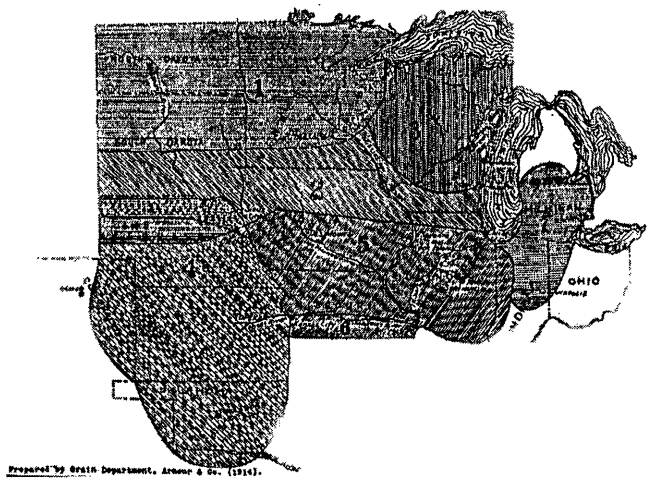
Number of Bushels Harvested, 1862 - 1915

Year	Number Bushels
1862	8,795,321
1865	8,284,565
1870	29435,692
1875	44,131,807
1880	31,154,205
1885	16,569,184
1890	8,249,786
1895	9,500,293
1905	5,859,747
1915	16,455,265

Source: Published volumes of the Census of Iowa, 1862 - 1915

The favorable freight rates enjoyed by these regional milling centers explained much of the competitive difficulties faced by Iowa millers. "In the old days," said the president of the Iowa Millers' Association in 1902, "if we could not get wheat enough at our doors, we could bring it in from Nebraska or Missouri, and make money doing it. Of late years – especially the last few – we have been unable to do this on account of the transportation charges, the railways discriminating in favor of flour, which comes in from other states. The big mills can ship in flour cheaper than we bring in wheat" (*American Miller*, 1902:586). The rapid development of milling in the southwest and the competitive freight advantages of these regional centers only increased pressures on local Iowa millers. Writing in 1933, Pickett and Vaile recognized the tougher marketing situation for flour in Iowa: "In early days – a single salesman of a Minnesota

company sold 100,000 barrels off flour a year in Iowa, whereas today five salesmen of the company sell only 50,000 barrels in the same territory. The same amount of business is still there, but it is divided among several competitors" (Pickett & Vaile: 9).



MAP VI.—TERRITORIAL COMPETITION IN PRIMARY GRAIN MARKETS

EXPLANATION OF NUMBERS ON MAP (Revised to March 12, 1923)

1. Tributary, as a general rule, to Minneapolis and Duluth. At extraordinary times wheat from this territory moves to Chicago.
2. Wheat from this location moves to either Chicago or Milwaukee. At times, however, western portion will go to Minneapolis or Duluth. A portion of the territory is extremely close and a slight variation will take it away from one market to another.
3. Wheat from this location is naturally tributary to Milwaukee, Chicago, Ashland, Manitowoc, or Green Bay.
4. Wheat from this location is tributary to Kansas City, St. Louis, Chicago, New Orleans, or Galveston. A slight variation in prices will take it away from one market to another.
5. Territory is tributary to either Chicago or St. Louis. Any slight variations in the market will pull from one to another. From southern portion, grain may also move to New Orleans and Galveston.
6. This territory tributary to St. Louis, unless Chicago market is out of line. Some movement also to New Orleans.
7. Wheat from this territory goes, generally, to Detroit or Toledo.
2A. Wheat from this section moves primarily to Chicago or Milwaukee, but is also quite likely to go to other markets north or south.
4 or 5. Wheat from this section moves primarily to Kansas City, St. Louis, or Chicago, but may go to other markets. At present considerable grain in the southern part of this territory goes to New Orleans and Galveston. This varies according to price variations as regards market, also as regards ocean freight differential between Atlantic and Gulf ports.

Fig. 6 Territorial Competition in Primary Grain Markets (Reproduced from G.G. Huebner, Agricultural Commerce [New York, 1924], p. 67).

The direction of the milling industry toward building larger units greatly worked to the detriment of Iowa's small and numerous mills. The country mills' position grew even more desperate as the more favorably located and better capitalized mills within Iowa opted to keep pace with their larger outside rivals by enlarging their operations. Thus they hoped to cheapen costs of manufacture through milling in greater quantities. And, by joining this to a better distributing and selling system, the "progressive" miller could more easily dispose of the goods produced so as to keep the mill running at full capacity. This growth in the average size of new merchant mills -though present in the large milling centers - became especially pronounced in the second and third decades of the new century (Thorndyke, 1922:481). Consequently, in addition to seeing ever more business diverted to the gigantic mills in Minneapolis and Kansas City, country millers had to fend off the encroaching growth of in-state milling centers in Des Moines, Sioux City, Cedar Rapids and Davenport. The mills in these minor centers - in construction, equipment, and amount and quality of flour milled - matched that of Minneapolis mills.

Some without sufficient capital competed by participating with others in one of the two waves of mergers through which several joined together in corporations. The first mergers occurred in the 1890's after the 1889 formation of Pillsbury-Washburn Flour Mills, Ltd. This set off similar consolidations by smaller worried competitors. A second series of great milling mergers took place during the 1920's in response to such conditions as bakery consolidations. When, for example, the International Milling Company expanded beyond their New Prague, Minnesota beginnings to purchase, among others, mills at Sioux City and Davenport, Iowa, it could take advantage of the milling-in-transit railroad rates through tapping "the stream of hard winter wheat flowing out from the Kansas area and manufacture it into flour for the Eastern market" (Kuhlman: 158-159).

The remaining small country millers - compelled to defend their interests and even their existence - still had a few natural advantages over big city mills. They were able to dispose of nearly all their mill products direct to their customers right at the mill door. They could often operate profitably when many of the large mills stood idle for want of orders and, although they could not survive on a profit of 25 cents a barrel as could the high volume 1,000 barrel mill running at full capacity, their overhead was less. Thus, the big city mill operated in centers of trade where property, rents, taxes and other fixed charges were high and where their scale of operation processes of producing, selling, distributing flour and keeping track of the transactions. But notwithstanding these inherent advantages, the small country mills of Iowa stood at a disadvantage in trying to market their surplus flour. They simply could not overcome less favorable railroad rates and lower returns resulting from their low volume sales of unadvertised brand name products through flour jobbers.

Steadily the Iowa country miller thus saw local demand for his flour whither. Two reasons stand out. First, advertisements that lauded the consistency and baking qualities of Pillsbury or Crosby-Washburn flour impressed housewives and grocers stocked increasing proportions of it to satisfy customer wishes. Even as early as 1902 one could hear the lament of President James Taggart in 1902 to his fellows in the Iowa Millers' Association. "In the old days," he said, "flour was shipped to our towns from outside, but local grocers and we ourselves sold our flour; now the grocers sell foreign flour entirely" (*American Miller*, 1902:586). This trend accelerated as Buffalo mills steadily closed out other regional centers from the export and eastern markets. It caused the huge interior mills at Minneapolis and Kansas City milling centers to aggressively step up efforts to unload their flour surpluses at low prices in Iowa and elsewhere.

Second, customers were buying less flour at the store than in times past. This decline in per capita consumption of flour (21 percent nationally between 1904 and 1923) drew from people's shift to a more diversified diet and to more expensive foods such as meat and dairy products, and to a marked decline in home baking. The trend away from home-baked bread advanced most quickly in towns and cities as working men turned to bakery made bread using cheaper grade flours. Although the vast majority of farm families continued to bake bread at home, even their change was evident. The increased accessibility to town by automobile on better roads made possible small volume purchases of popular bag flour and bakery produced goods at the store along with more frequent stops at the bakery for convenience items. And, if time did not permit, the family could patronize the bread-wagon, coming right past the farm (*Wheat Studies*, 1926:265-278; Picket & Vaile: 33-45; Deck, 1934:40).

By 1900 mills situated out along streams in the Iowa countryside had nearly disappeared. Those located in Iowa towns held out longer. Country people continued to like going to town to mill where they could do their trading and, for that reason, towns people wanted a mill in their village to attract the farmer's trade. This advantage the steam mill situated along the railroad tracks in town had always enjoyed over its remote and isolated country competitor. But even so, the abandoning of wheat growing in Iowa localities coupled with the aforementioned disappearance of flour markets forced remaining rural flouring mills to fall into disuse or be converted into feed mills and their owners adjusted their machinery and marketing methods accordingly. Even so, many feed mill owners then proved unable to withstand the competition of those who went into the portable feed grinding business against their stationary machine operations. The 685 flourmills of 1880 had declined to 309 by 1900 and stood at 276 in 1905. Losses only accelerated thereafter, the mills numbering about sixty by 1940 (1880 federal census, 1905 Iowa census, Swisher, 1940:291-292, 294-295). The day of the typical small Iowa mill had passed. Only a very few large city merchant mills remained after 1950 of a once widely distributed industry that had dominated the economic life of rural and small town Iowa.

Associated Property Types

I. Name of Property Type: Flour Milling Facilities

II. Description:

The properties were built principally to grind wheat into flour although they commonly also included means for grinding corn, rye, and buckwheat into flour and feed products. The facility typically included four elements. The primary building—the mill itself—housed the equipment for cleaning, preparing and reducing the wheat to good quality flour, for packing flour into barrels or containers for shipment, and ways and means for handling the others mill byproducts. The main secondary structure contained the components for producing power to drive the mill. In the case of waterpower, this embraced a milldam, millrace, and turbine pit or waterwheel. For steam power, a small shed roofed building could be found adjacent to the mill building for housing, maintaining, and fueling the boiler and steam engine. Another secondary support structure almost always present comprised a place for receiving and storing grain (e.g., warehouse or elevator). Finally, one might find ancillary buildings such as a cooperage for manufacturing barrels, a barn for horses and wagons to handle freight/delivery tasks, and perhaps the miller's house.

The expected condition of mill properties varies considerably with the location of the property type and subtypes. Remote early water powered mills are likely to be abandoned and in a state of severe dilapidation or ruins. The same is nearly true of mils situated in now abandoned towns. Of the small town mills that still exist, the condition is likely to be better but owing to being converted over to feed mills and other uses, their appearance has been often considerably altered. Nevertheless, because the smaller and older mills were mainly wood frame structures with wood siding, there is greater likelihood that such mills have suffered deterioration due to neglect, lack of use, and weather. The larger more substantial mill buildings in cities are likely in better condition, due to being better maintained after their conversion to other purposes.

III. Significance

Beginning in the 1840's and attaining great prominence from 1860 to 1900 before slipping into decline, these properties represented the state's once leading and most broadly distributed industry: flour milling. Its associations of significance are with the development of Iowa's agriculture related industries and her patterns of settlement and townbuilding. Flourmill buildings are significant under National Register Criteria "A" or "B" or both, when evaluated at the local level of historical development. Additionally, Criteria "C" may apply in mills that embody particular methods of construction as determined after considering their relation to other properties statewide. Some mill facilities may be significant under Criterion "D" if, upon evaluation at state or local levels of development, the property's subsurface features may yield information of significance. This includes important data about the history of the area or comparative data to increase existing knowledge about various means used to provide and transmit power to the Iowa mills or about the configuration of mill facilities. The primary "Area of Significance" for listing such properties is INDUSTRY, with some listed under EXPLORATION/SETTLEMENT and ENGINEERING.

Certain variations occurred within the flour mill property type due to the changing nature of milling processes, scale of operation, power requirements, and when and where mills were being built. Four subtypes stand out:

A. SUBTYPE: SMALL COUNTRY MILLS SERVING THE HOME TRADE, 1840-1872.

During these years nearly every neighborhood had its traditional "old process" waterpowered mill. The plentiful supplies of waterpower that existed in the rugged "little Switzerland" counties of northeastern Iowa made this area one where mills proliferated, especially during the years 1850-1875 when this was the state's wheat country.

Country communities were numerous and mills were numerous in this era of settlement when markets and towns were accessible mainly by road and water transport. In such circumstances, finding a good source of waterpower typically outweighed commercial and shipping considerations in locating one's mill. "The mill was the arbiter," stated one milling authority in 1905, and usually could be found "located not to suit the convenience of the trade, but the convenience of the mill owner, who knew full well the trade would say 'Wither tho goest, there will I go.'" For at that time the miller had no need to fear "railroad towns where elevators were located anxious to buy wheat and general merchandise stores anxious to sell flour that had been shipped in from other sections to attract the farmer's attention away from the inconveniently located mill" (Abernathy, 1905:3887). Being a customer gristmill serving a small neighborhood of wheat raising farmers in fairly close proximity to other mills upstream or downstream, the size of these remote mills remained generally small.

The physical shape of the structure tended to be lower and squat, suited to the needs of less complicated milling and less machinery. The early rural Iowa mill had increased somewhat in height since the mill of colonial days after Oliver Evans' introduced his turn-of-the-century improvements known as the "automatic American process." These improvements required more height to accommodate the working of devices for lifting and moving grain through steps of milling without the help of human hands. But its successors mill buildings would rise even higher with the introduction of yet new processes for milling.

The country mill typically comprised a wood heavy timber frame structure mortised and tenoned together that rose two stories above a basement foundation. When first built, a water wheel often ran the oldest such mills, transmitting its power by means of a wood horizontal shaft connected by wooden gearing to an immense vertical shaft rising about the floor. Off of that shaft ran the burr stones for grinding the grain as well as other machinery for moving and processing grain and flour. "The stupendous nature of the burr stones for grinding the grain as well as other machinery for moving and processing grain and flour. "The stupendous nature of the burrs, their surroundings and driving apparatus, in the olden times," wrote R. James Abernathey, "made the first floor the grinding floor as a matter of necessity; and even then no part of the weight of the ponderous outfit of burr, husk frame and gearing rested its great weight on special foundations at the bottom of the basement and carried the weight on the floor proper." Rather, "the husk frame rested on special foundations at the bottom of the basement and carried the weight and sustained the strain of the running burrs and driving gearing independently of the mill building" (Abernathy, 1905:324). In these country mills the mill owner designed the mill the way he wanted and the old-time millwright, using but a few pieces of iron for fastening things supplied by the local blacksmith, fashioned all the necessary shafts and wheels of wood.

Few of the wood framed mills from that era exist today in Iowa. There is the Village Creek Flouring Mill, one of the early 1850's mills of Allamakee County which, by the first decade of the twentieth century, A. C. Doehler had ceased to operate. Since then the mill has stood vacant and an increasing need of repair. Another is the Pine Creek Mill-built about 1850 and "restored/reconstructed" by the State Conservation Commission in 1932- and operated today by the Iowa Department of Natural Resources for visitors to see at Wild Cat Den State Park in Muscatine County. Later examples are the Rhodes Mills at Fertile.

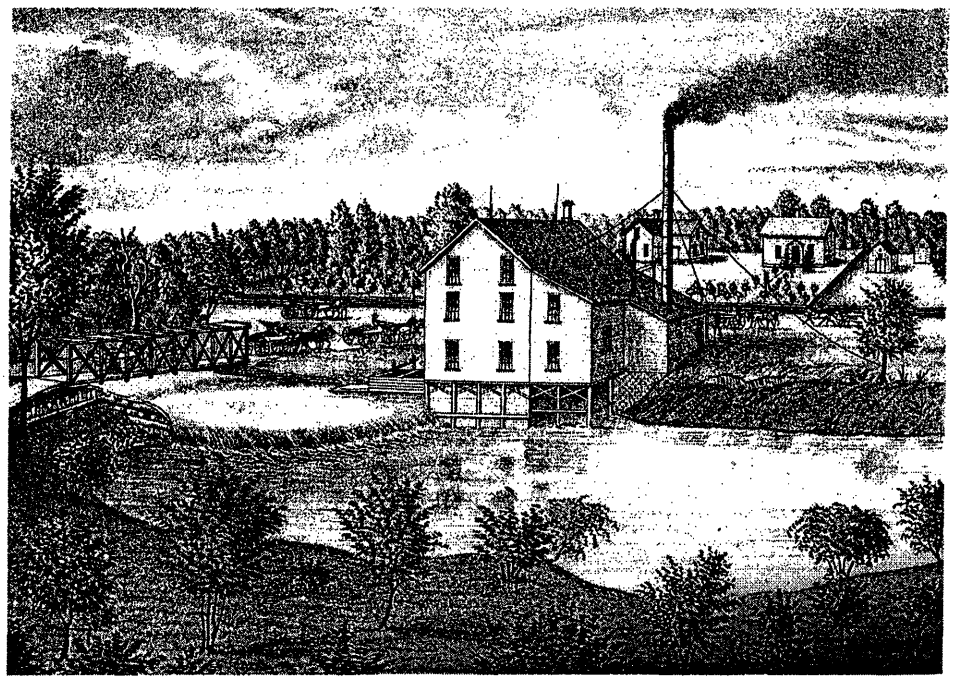


Fig. 7 A common "old-process" waterpowered mill built in the 1860s. This is an 1875 view of the Franklin Mills in Story County. Its owners, Thomas and Robert Hannum had in 1870 added steam power, expanded the structure to three stories, and installed new bolters. Today only a large surface depression on the right bank marks its former location along with a few remnants of the log crib dam on the South Skunk River. (A. T. Andreas Illustrated Historical Atlas, [Chicago, 1875], p. 322; D. N. Ballard, Jr., "Nineteenth-Century Mills and Milling Industries in Story County, Iowa," Journal of the Iowa Archeological Society, (1984), 168-174).

While nearly all of the more remotely located wood framed mills are gone, a few substantial stone mills exist in or near small towns that originated during this early era of country watermills. These include the stone mill in Spillville that dates before 1870 and Motor Mill from 1864.

In total, fourteen extant examples of this mill subtype thus far have been identified; eight of which have been listed on the National Register. They include, in chronological order, the following mills:

A. **Lynnville Mill (1848) – Jasper County –** [redacted] – Wood frame – Current use: museum – Listed on the National Register –

2. **Spielman Mill (1849) – Winneshiek County –** [redacted] – Stone –current use: grain mill

3. **Pine Creek Mill (ca. 1850) – Muscatine County** [redacted] – Wood frame – Current use: museum – Listed on the National Register.

4. **Painter-Bernatz Mill (1851) – Winneshiek County** [redacted] – Stone - Current use: museum – Listed on the National Register

5. **Village Creek Flouring Mill (1853) – Allamakee County –** [redacted] Wood Frame – Current use: vacant

6. **Valley Mill (ca.1853) – Clayton County** – [redacted] – Stone – Current use: being converted into residence – Listed on the National Register.

7. **Motor Mill (1864) – Clayton County** –[redacted] Stone – Current use – vacant - Listed on the National Register

8. **Stewart's West Point Mils (ca. 1865 – Lee County** [redacted] – Stone - Current use: - unknown

9. **Shell Rock Mill (1867-1868) – Butler County** [redacted] Wood Frame – Current use – being converted to residence.

10. **Seneca Williams' Oakland Mills (1867) – Jackson County** [redacted] – Stone – Current use: - art studio/residence – Listed on the National Register

11. **Rhodes Mill – (1868) – Worth County** [redacted] Wood Frame – Current use: - residence – Listed on the National Register

12. **Primrose Mill (1871) – Lee County** [redacted] Brick – Current use – vacant – Listed on the National Register

13. **Staudinger Mill** [redacted] – Stone – Current use: barn

14. **Ames-Weist Mill (1871) – Winneshiek County** [redacted] – Wood Frame – Current use – unknown

B. SUBTYPE: LARGE PRE-1872 MILLS ALONG THE MISSISSIPPI AND IN OTHER RIVER TOWNS

During the years when millers were establishing small rural custom mills to serve farmers in their local neighborhood, another class of mill took form in the larger cities of the state, especially along the Mississippi River. Known as "merchant mills" their owners established themselves mainly to engage not in grinding on a local custom basis, but to mill flour for sale in the export and the general trade of the country. These larger commercial mills soon appeared in Mississippi River towns as owners sought to take advantage of their location on this vast river of commerce. This put them in greater touch with large and varied wheat supplies and made possible the shipping of large quantities of flour for sale to St .Louis and eastern markets. And, in the pre-Civil War years before the dramatic growth of railroads opened new opportunities for merchant milling at towns within the state, river access dominated the flow of trade.

As a result, the 1850's found among the large riverfront mills those such as the Albion Mills of J. M. D. Burrows and R. M. Prettyman in Davenport. While a couple local mills ground for the local trade, "our flour was made for export," wrote the brother J. M. D. Burrows in later years. The flour "went to commission men in Boston and New York who shipped it abroad" (*American Miller*, October 1, 1906: 841). Joseph Bennett owned another such mill at Muscatine. Commonly built of brick and powered by steam, the merchant mills brought commercial fortunes for their owners that rose and fell with the tides of national economic life. Of these large Mississippi riverfront mills, only the Bennett mill survives and is in use by an industrial tool company.

Some sizeable mills that combined custom and merchant mill operations could be found situated on good waterpower streams near the Mississippi River. These included such operations as G. Potter's Jasper Mill on the north bank of Mill Creek at Bellevue and John Thompson's Sageville Mill on the Little Maquoketa River near Dubuque. The Potter mill continues in use today as a restaurant.

Additionally, certain large mills took form in the state's interior rivers where continuous and substantial waterpower and good grain supplies could be obtained. Numbering among these mills was the mill at Independence on the Wapsipinicon River, which continues to stand today.

To date, three extant mills have been identified of this subtype, two of which are listed on the National Register. In chronological order, the include:

1. **E. G. Potter's Mill (1840's) - Jackson County** [redacted] Wood Frame – Current use – Restaurant – Listed on the National Register.
2. **Bennett's Mill – (1851) – Muscatine County** [redacted] Brick – Current use – Commercial/industrial
3. **Wapsipinicon Mill (1867) – Buchanan County** [redacted] Brick – Current use – museum – Listed on the National Register

C. SUBTYPE: NEW PROCESS AND ALL-ROLLER PROCESS ERA MILLS, 1872-1910

The world of milling changed radically with the introduction of middlings purifier in 1872. This followed in the form of the shorter centrifugal reel to replace the old long gravity operated reel. Then came the roller milling system of gradual reduction in 1880, dust collectors after the mid-1880's, steam and heating devices to toughen the bran so that it would come away whole from the wheat kernel, and displacement of the centrifugal reel by the horizontal screen type plansifter after 1900. All these matters worked together in shaping the mill buildings of their day. "The mill building of today," wrote the editor of the *American Miller* in 1901, had evolved considerably: "The broad mill of the past has disappeared in current mill architecture. The old system called it into existence and the roller system changed it to a distinctly narrower and higher structure" (p.34)

The effect of these changes on mill architecture went unnoticed by some at first—coming as they did in incremental fashion—but the general direction of things soon became clear. "While the tendency seems to be to reduce the height of factories for manufacturing textile fabrics," wrote Robert Grimshaw in 1882, "'skyward' seems to be the motto for flour mills. This is not from fashion, for the conditions of the two factories seem to be entirely different" (Grimshaw, 1882:10). The more complicated arrangements called forth mill buildings of three or four or more stories, but of equal importance, the traditional floor to ceiling height of each story needed to be raised. "All are agreed," stated one contributor to the *American Miller* in 1882, "that from ten to twelve feet ceilings are best, thereby giving opportunity for spouting stuff at a good angle, avoiding the choking and general derangement of the mill in its work" (*American Miller*, 1882:66). That was well and good for the new mill, but what was the miller to do with managing the requirements of these new processes in his old mill? Richard Birkhoiz described in that same year some of these difficulties being faced by both millwright and miller:

> "The millwright visits a mill, and is asked to use his best judgement in effecting a change embodying the latest improvements. He examines the building; he finds low and few stories and feels somewhat discouraged; he feels still worse when he finds a cupola roof, contracted upper story with waste-room under the main roof.
>
> "When the miller consents upon his advice to take away the roofs and carry up the building full size, making high stories of such gained room and putting on a flat roof, the millwright begins to 'take some heart into his work.'
>
> A new process mill must have high stories – a building with basement and four to five stories above. I do not say that a new process mill cannot be made out of a cupola topped building

with few floors -oh, no - but a surplus of elevators, shafting and gearing must be resorted to" (Birkholz, 1882:38).

In refurbishing old mills, millwrights had to overcome the strain of overcrowding machinery into a light or flimsy building inadequate for its purposes and the weakening of the building from cutting into the floors to install additional elevators and spouting.

The purifier had first revolutionized things by complicating milling - increasing the number of wheat reductions and flour separations in a mill where heretofore the wheat merely passed once through the burrs and a reel on its way to a flour packer. But what especially pushed the shape of the mill building in new directions was the introduction of new bolting devices and roller mills. "The change from burrs to the rolls," wrote Will L. Burner at the turn of the century, "led to the use of larger buildings and especially increased height, while the change to the sifters tends to greatly reduce the size of the buildings for a given capacity" (Burner, 1901:48).

The bolting devices changed things by becoming smaller while their capacity enlarged. In earlier Old-Process times when the aim was to make a finished grind of flour at one operation, the wheat ground on the millstone passed down through a single rotating hexagonal shaped, silk covered, cylinder for sifting out the flour from the bran. With one long and cumbersome hexagon reel for each set of grinding stones, each reel being 18, 20, or 24 feet in length - depending on the size of the burr stones - sufficient building width had to be allowed for its operations. The more complex New-Processing milling, which required more "siftings" for separating elements of the grain and yielding grades of flour from the "purified" and reground middlings, called for a great increase in bolting apparatus. How to accomplish this preoccupied New Process millers and their need for improved bolting methods became even more urgent as high capacity roller milling came on in the early 1880's. Centrifugal reels dominated efforts at solution during the 1879-1885 years.

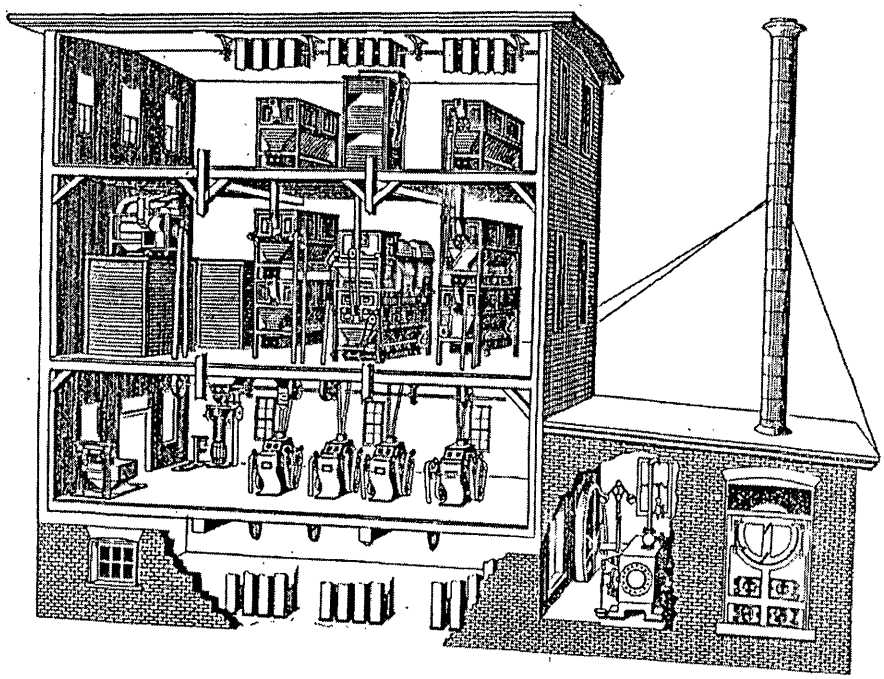


Fig. 8 *Cutaway view of an 1892-roller system flour mill. This represents one of the Edward P. Allis Co.'s latest fifty-barrel flouring mill, the building being 30x40 ft., with basement and three stories. The mill house is of frame and the engine room is of brick. Note the increased height of the second story. (From their catalogue "Small Modern Mills" as reprinted in United States Miller, (Dec. 1892), 271).*

This consisted of an outside cylinder covered with silk cloth rotating slowly, inside of which were beaters that threw the meal against the silk to force the flour through the cloth along with brushes to keep the cloth clear from clogging. Not only did they have several times the capacity of the old gravity reels, but more important for our purposes here, it was only a third as long (Kuhlman:125; Storck & Teague,1952:217). The coming of the roller system in the early Eighties multiplied greatly the number of reels needed. It encouraged the design of reel chests averaging eight feet in length of standardized manufacture whereby each chest might contain any number of reels placed one above the other. This vertical placement of centrifugal reels increased capacity while decreasing the amount of space needed in the mill building.

But what made the greatest difference and set the milling world on fire was the Haggenmacher Plansifter. Introduced to American millers in 1892, the machine amounted to a square box (containing a series of flat sieves) which hung from the ceiling by flexible rods and was made to gyrate from underneath, which caused the stock to move along the flat sieves. Among its chief advantages and importance was the lesser amount of room required because, with the sieves being placed one above another, the stock bolted through simply and dropped onto the next sieve without needing to be carried by conveyors or lifted by elevators. Thus the room occupied by the bolting or sifting machinery became increasingly contracted (Burner,1901:48; Storck & Teague: 261-263; Kuhlman: 226-227; Dedrick, 1924:172; Clark, 1922:496).

The introduction of rollers chiefly influenced the "upward" tendency of mill architecture by virtue of encouraging a kind of mill building to be constructed that would best fit the new high volume system of gradual reduction with its greater complement of numerous purifier and sifter machines. Millbuilders found that a building of greater that lessor height permitted machinery and the flow of material to be most easily arranged while keeping to a minimum the addition of power consuming conveyors and elevators.

Perhaps the most visible earmark of mills built during this era is the greater height of the second story where most of the sifting and bolting machinery resided. Sometimes the third story, where one commonly found purifier and dust removal equipment, also exceeded that of the first story with its stronger floor system on which were fixed the stands of roller mills. Thus for a 30 x 40 foot mill producing 75 barrels of flour daily, the recommended height of stories cited in 1884 was basement, 10 feet; first story, 11 feet; second story, 14 ½ feet; and attic,11 feet (*United States Miller*, May 1884:11).

A less visible sign of roller mill design lay in the shift in means used to transmit power from the engine to the milling machinery. In Oliver Evans day up to the mills of 1872, a heavy wood main upright shaft extended up to the attic from which power was taken off by gears at each story with only limited instances of line shafts on the stories carrying pulleys or driving machines by belt. Vertical shaft drives rapidly fell into disuse after the onset of roller milling, however. Now horizontal shafts drove the rolls and other machines and a strong prejudice grew against upright driven machinery. Wisconsin mill builder Albert Hoppin said it well in 1885: "Slowly, but none the less surely, the slow-moving old wooden and cast-iron shafts have given place to quick running, light wrought-iron shafting; the belt has driven out the upright shaft, and done away with cumbersome gearing; elevators now stand in line, and perpendicular instead of 'hit or miss' at all angles; and last, but not least, the millstone has been rolled our of doors, and the roller mill reigns instead" (Hoppin, 1885:13; Thorndyke, 1922:477; Burner, 1901:48).

The growing complexity of milling processes had an additional effect on mill buildings design. The miller handed over the duty of determining the architecture and lying out and directing the sequence of the mill's operation to the milling engineer and mill-building firm. As a result large manufacturers of flour milling machinery such as E. P. Allis and Nordyke and Marmon and others established mill-building departments which drew up mill furnishing plans and handled the construction of mills as a package arrangement. Such firms also contracted to completely overhaul and remodel the older mills with their new machinery. In 1882, for example, the Independence Mill Company contracted with E. P. Allis & Co. to remodel their Wapsipinicon mill into a roller system operation (*United States Miller*, 13:59).

During this era balloon frame construction could be found in smaller western mills, but most preferred heavy frame construction, even when the walls were of brick or stone. By using mortise and tenon, with draw-bored pins, the necessary stiffness could be obtained for handling the multitude of vibrating machinery. After the turn of the century, however, brick and concrete came into greater use. By 1905 this new direction of things had reached sufficient proportions that the editor of the *American Miller* discussed its influence on mill building of the future: "Heavy timbers particularly, such as are needed in an establishment like a flour mill, are becoming expensive, while steel, cement, brick, tile and fireproof building material have steadily become cheaper with improvement in processes and the great increase in production." Therefore, as "the margin of difference between the two classes is steadily growing less everywhere, and as lumber becomes scarcer and higher, there is little doubt that before long, new wooden buildings will be rarely met with except in some localities" where prices are high for the new construction materials (*American Miller*, Aug. 1, 1905:654.

Out of this maelstrom of new processes, certain Iowa mills benefited more than others did. The ones that stood to gain the most from expanding capital in refitting their mill or building now were the mills most favorably situated with respect to rail connections and access to wheat supplies. Millers wanted to build alongside tracks of busy rail lines, especially where principal lines crossed. The small waterpower mill or those situated on small branch lines needed to stand additional expenses for transporting grain, flour and offal. But the large steam mill erected near where main lines of railroads crossed could take full advantage of the railroad's best facilities for receiving wheat and shipping its products to the large consuming centers as well as securing needed coal supplies for fueling the steam mill, As a Creston, Iowa miller stated it in 1880, "the large mill, with better rates of transportation, and buying the wheat for less money, could run at a profit where the small mill would have to stand still or run at a loss." He then went on to describe the best configuration of such mills:

> The mill should be built directly upon a side-track of the railroad over which the bulk of the business will probably be transacted, with one side abutting upon the track, allowing a space of about six or eight feet for a platform running the whole length of the mill for convenience in loading flour direct into cars. Adjoining the mill in the rear, and on a line with the track, should be the engine and boiler-rooms, with sheds bordering upon the track , so that the coal could be shoveled direct from the cars into the bins. Where circumstances will permit, there should be a separate building for the storage of grain, flour, offal, etc. This building could be located in front of the mill on a line with the track (*American Miller,* May 1880:235-236).

Millers took advantage of these circumstances to build large merchant steam mills and it made certain Iowa cities into regional milling centers. The state's largest merchant mills during this era stood in Des Moines, Sioux City, Davenport, Sheldon, Le Mars, (steam & waterpower), and Cedar Falls/Waterloo (steam & waterpower). Smaller but substantial operations also could be found at Boone and Council Bluffs.

Thus far, unfortunately, only four existing examples of this subtype have been identified, one of which is listed in the National Register . They include, in chronological order:

1. **Harlan City Roller Mills (ca.1871) – Shelby County** [redacted] Brick – Current use: Grain mill.
2. **Rockford Mill (1872) – Floyd County** [redacted] Frame – Current use: Unknown – Listed on the National Register
3. **Meeks Mill (1878) – Van Buren County** [redacted] Brick – Current use: Restaurant – Listed on the National Register
4. **Mitchell-Maskery Mill (1885-1886) – Jackson County** [redacted] Brick – Current use: Grain Dealer
5. **Hummer Mill (1906) – Johnson County** [redacted] Brick – Current use: Law offices

4. SUBTYPE: "DAYLIGHT CONSTRUCTION" MILLS IN LARGE IOWA MILLING CENTERS, 1910-1930.

After about 1909 the use of concrete and steel came together to displace wood. Beginning with elevators and then proceeding to mills, industrial applications of reinforced concrete and steel paralleled the increasing average size of new merchant mills. By the end of World War I—a period marked with a building boom of large merchant mills in response to high wartime wheat and flour prices—the visitor to a new flour mill building of large capacity saw a new form. Known as "daylight construction" or "daylight type" mills, the building contained "more windows than wall".

Hailed as marking "a new era" wherein the modern daylight, fire-proof mill stood "a towering monument to the genius of mill builders," these six to eight story structures were built of reinforced concrete with brick facing and window openings enclosed by heavy steel frames. And yet, use of this form of construction in flourmill buildings had tended to lag behind those of textile and other industries. This is because the many connections among machinery between floors for flourmills demanded more planning to accommodate reinforced concrete floor construction.

But once worked out, the millers took great satisfaction in its fireproof qualities, the carrying capacity of the floors with reduced troubles of machinery vibration, and the increased efficiency of being to work with more daylight penetrating the mill. "To give rigidity, strength and longevity to a mill building," stated an editor of *American Miller*, "it used to be necessary to make thick walls with little window space. Some of the old mills that survive make you wonder what millers have not developed the eyes of an owl that can see in the dark." But now the combination of steel and concrete having made it possible to replace walls with glass without causing the strength of the building to suffer and, assisted by the results of studies from new science of efficiency which showed improved work output by working the daylight, few remained who "clung to the old prison-like designs" for mill buildings (*American Miller*, Dec. 1,1918:1013-1014).

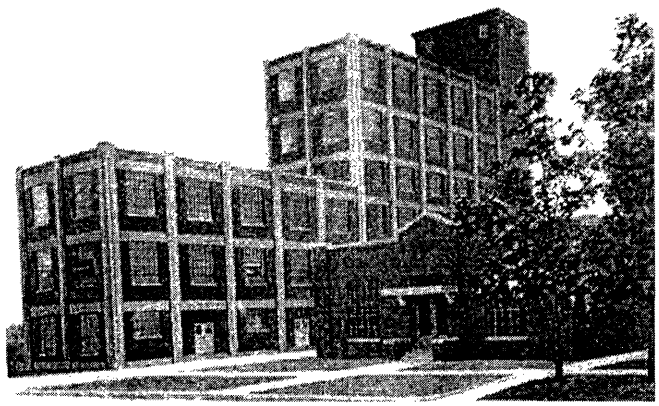


Fig. 9 Daylight construction mill of Bast-Fogarty Milling Company, Des Moines, Iowa completed in 1918. (View from Des Moines, 4 [March 1919], 26).

The daylight type mill, when completed and ready for the millwrights to install the machinery, contained in the solid concrete floors and wall holes for proper size and shape for every spout, elevator, shaft and bolt needed for the finished mill. Sheet metal replaced wood in all of the grain elevator legging, spouting and pipes. The general layout for the plant resembled that of most other large capacity merchant mills. In a six-story mill, the first and second stories commonly accommodated the work of packing, storing and shipping products of the

mill, the line of rolls stood on the third floor, the fourth floor gave itself over to spouting, the lines of purifiers and bolters/sifters were on the fifth floor, and the dust collectors on the sixth floor (*American Miller*, Dec. 1, 1918: 1013; May1,1918:383; June 1, 1919:512; Hess, 1919:53).

Just such a plant took form in Des Moines during 1918—the only example of a daylight mill construction identified thus far in Iowa. Out of the ashes of a fire, which destroyed the Bast-Fogarty Milling Company the previous year, there arose a six-story mill of daylight construction having white concrete exterior trimmed with red pressed brick and Bedford stone. The mill, located alongside ample track facilities and next to a heavily traveled street running from the State Capitol to the Fair Grounds, was driven by electric motors running off city lines. Capable of producing 1,250 barrels of flour daily, the mill's capacities also included output of 250 barrels of corn flour and meal and 1,500 cases of pancake flour. Since 1928 the building has operated as Inland Mills, Inc. and the mill building still exists today, as does its one-story office situated nearby (*American Miller*, Dec, 1, 1917:979, Oct 1, 1918:847-848; Steen, 1963:207-209).

IV. Registration Requirements

In order to qualify for listing, mill facilities need to meet the following requirements:

1. Significance

Criterion A:

The mill must strongly characterize, reveal, or recall a leading event or pattern of events that significantly influenced the development of Iowa's flour milling industry or its contribution to local and state development in agriculture and settlement. Specifically this includes mills:

a. That became a catalyst for, or served as a mainspring of, town development;
b. That call attention to a once prominent wheat growing district of Iowa, hence illustrating the changing conditions of agriculture in the state;
c. That reveal the arrival of new milling processes and dominant mill power arrangements in terms of their traits and relative distribution across Iowa; or
d. That recalls the concentration and character of merchant milling in the state at different moments of her milling past.

Criterion B:

The mill must be associated with a person or persons who:

a. Importantly influenced the origins of a town or the direction of its development
b. Elevated the mill to special prominence in the community's economic life;
c. Led in the establishment of, or played an influential role in events associated with, Iowa millers organizations
d. Led in introducing and promoting new milling processes, power arrangements, and varieties of wheat.

Criterions C:

The mill must possess the distinctive characteristics of:

a. A scale or type of milling or construction method that predominated during a significant period of Iowa's milling past. This includes:
   (1) Small country custom milling geared to the home trade, 1840-1930.
   (2) Large early merchant mills grinding for the export market, 1840-1930.
   (3) New Process or roller mills grinding establishments, 1872-1910.
   (4) Growth of regionally dominant merchant mills in Iowa towns and cities,1880-1925.

a. A method of producing power for the mill that became a prototype for, or represented a class of, mill power arrangements common to an important category of Iowa mills.

b. A mill configuration that well illustrates the functional relationship of the principal mill building with associated structures for producing power (milldam, millrace, wheel or turbine), storing grain, and other appurtenant structures.

Criterion D:

A mill with intact subsurface features that show a high likelihood of yielding information important to understanding:

a. The milling history of the area;
b. The various means used to provide and transmit power to Iowa mills;
c. The previously unknown configuration of a mill facility.

Guidance on the potential for archaeological research at waterpower mill sites is found in Robert D. Newman, *Archeological Investigations at Seven Mill Sites* (Atlanta, GA: National Park Service and U. S. Army Corps of Engineers, Savannah District,1984).

2. *Integrity*

Mill properties have changed greatly over time. Milling processes and its machinery have been replaced as has the methods for producing motive power and its transmission to milling machinery. Therefore it is not expected that any mills retain their original means of motive power, power transmission, millwork or machinery, although pieces of it may be evident. Also, because most flour mills no longer function as such—having been converted into new uses such as feed mills, warehouse space, or lying empty—it is not expected that secondary wood frame structures associated with the original flour milling functions of the main mill building still exist, such as the grain elevator, warehouse, barn and house, although portions of former waterpower arrangements (mill dam, millrace, etc.) may be evident.

Rather, the main test to be applied here is whether the principal mill building still retains its original siting and retains the essential physical features that made up its character or appearance during the period of its importance. The mill building should retain sufficient of its original appearance to have been recognizable to the occupants during the period of its significance. The site must convey an overall sense of its time and place - former merchant mills located along a railroad track must still be able to convey that former relationship and small country waterpower mills must continue to be near the stream or river of its origin. A water powered mill, for example, would be eligible if it still occupied its original site, if its setting is at least partially intact, if the exterior retains most of its historic materials, and if it has the basic features expressive of its design and function (such as configuration, proportions and fenestration pattern.)

Comparative information about similar mill properties is to be considered when evaluating the integrity of a mill property that is a rare surviving example of its type or subtype. The rarity and condition of the other extant examples of the type may justify accepting a greater degree of alteration or fewer features, provided that enough of the property survives for it to be a significant resource.

Conversely, under Criterion D, a historic mill site with information on how site patterning reflects its historic functions, but which has lost portions of the complex, will not be considered eligible for its information potential if comparative information on other mill sites indicates that more intact properties with complete information are available. In general, buried mill site features which are

eligible for their information potential will be considered to retain their integrity if the subsurface deposits have remained sufficiently undisturbed so that they survive in a condition (i.e., retain enough of their original content and spatial relationships) capable of yielding valuable data.

Geographical Data

The geographical area covered by this multiple property listing is the State of Iowa.

Summary of Identification and Evaluation Methods

1. Data Collection

The information used for this multiple property analysis represents part of an extensive research effort that amassed material for, and was predicted on, publishing a book to call attention to surviving mills and to the importance of flour and other grain mills in nineteenth and early twentieth century Iowa history. The publication was to feature not simply surviving mill structures, but to include a catalog of known mills (including information and photos) that had once existed in Iowa. This broader endeavor embraced flour milling, but reached beyond to include oat and cereal milling, Iowa mill machinery producing firms, Iowa mill invention patents, Iowa millers' organizations and mutual insurance company. The information drawn upon for this document thus represents the portion of the previous larger project that concerns the flourmills of Iowa.

The data drawn upon for this multiple property document is based not on field verification/documentation activities, but on extensive library research and the creation of individual site files. The work began in the summer of 1983 and continued intermittently until summer's end of 1986. The tasks were done in light of three types of investigations then planned to be undertaken: library research, mail surveys, and field verification/documentation. The subsequent work never moved beyond that of library research.

a. Library Research

This phase of the work had as its objective to comb primary and secondary sources for information pertaining to Iowa grain mills and organize the date into individual site files. The following tasks were accomplished:

(1) Completed a search photo collections at the Iowa City and Des Moines libraries of the State Historical Society of Iowa.

(2) Photocopied all mill-related information from the State's collection of county and municipal histories.

(3) Recorded information on each Iowa mill that is contained in Federal Industrial Censuses for the years 1850, 1860, 1870 and 1880.

(4) Prepared 5" x 8" card file of Iowa mills (organized alphabetically by name of town) that are listed in Iowa state gazeteers and in Cawker's 1880 and 1890 catalogs of millers. These tasks have been approximately 80 percent completed.

(5) Examined available pre-1940 issues of the *American Miller and Processor*, *United States Miller*, *Weekly Northwestern Miller*, and *Mill and Power*, and perform the following tasks:

(a) Recorded on 5" x 8" cards or, for lengthy items, photocopied information related to five kinds of topics:
  (1) The Iowa context of milling, that is, milling trends and agricultural and transportation patterns in the Middle West and Upper Midwest that were changing the face of the milling industry in Iowa.
  (2) Concerns of, and resolutions passed by, various associations of Iowa millers, especially those that relate to inroads being made by outside competitors into their trading territory and measures devised to combat unfavorable transportation rates.
  (3) Specific references to individual Iowa mills.
  (4) References to major milling outfitters operating in Iowa (i.e., providers for entire mill buildings or architectural services, complete machinery installations, etc.)
  (5) Historical treatments of changing milling techniques and practices.

(b) Photocopies illustrations and photographs of Iowa mills and Iowa mill advertisements, using Kodak Technical Pan or Pantomimic X film.

Status of trade-journal research completed:
Considerable time was spent during 1984 and 1985 going through volumes of the trade journals obtained through interlibrary loan. With the help of summer employees, information was gleaned from the following issues:

(Milwaukee) *United States Miller*, 1878-1894. These are known issues in existence.

(Chicago) *American Miller and Processor*, October 1877, 1882, 1884-85, November-December 1890, February -March 1894, 1897-1943. This is the most informative of the trade journals with respect to Iowa mills and milling. The journal began in 1873, but we have been able to find only scattered issues up to 1897.

(Minneapolis) *Weekly Northwestern Miller*, 1897 - 1900, 1902-1907. This important journal lasted from 1873 to 1973 but, based on the span of issues we examined, it appeared to ignore the average mills in favor of large operations and to have been Minnesota-oriented with little information pertaining to the Iowa situation .

(6) Established a reference information file system organized by subject, but most of the accumulated information has yet to be filed within it.

(7) Created individual mill site files. Between 1983 and 1986 a large amount of unfiled data had accumulated. In the summers of 1986 and 1987 a summer employee was assigned the task of organizing the information, first by county, and then within each county by individual file for each mill in the 99 counties. Although a considerable amount of information was unable to be connected to an individual site file due to imprecise location information and changing mill names that arose from new ownership, the summer employees completed all that could be done within the time available.

(8) Began examining county atlases, plat books and Sanborn fire insurance maps to verify the location of individual mills. The specific location of a large number of mills, especially those that existed before 1885, is but vaguely known. Also the Sanborn fire insurance maps contain much additional information about the character of many mill operations (e.g., size of building(s), kinds of machinery, etc.). This work, about ten percent completed, helped clarify or confirm site locations in our individual files and has

placed the office in a better position to establish priorities for, and carry out, on-site field verification activities.

b. Multiple property document: evaluation and analysis.

From the accumulated reference sources—secondary works, mill trade journals, county and municipal histories, censuses, state gazetteers and newspapers—information was distilled that could help place Iowa's flour mills into historical context and identify and assess the major "types" of mill properties. This was augmented by information contained in the Bureau's mill site files, including previous individual National Register listings.

2. Determination of "historic contexts"

The place of flour milling as a significant context of Iowa history derives from the leading position that this dispersed industry held in Iowa's development. Flour milling speaks to the rise of the state's agricultural related economy and of the transforming adjustments and the change that agriculture has undergone.

As a category of history identified in "Iowa History 96: A Plan for the Preservation, Interpretation, and Use of Iowa's Historical Resources," (draft document of the State Historical Society of Iowa, August 1987), flour milling most closely related to the "Food processing" aspect of "Manufacturing and Processing", which is one of five identified themes of "Economic Activity".

3. Basis for determining significant "property types"

The property type and its four subtypes derive from having examined Iowa's economic patterns in relation to changing technical processes. The leading economic patterns focused upon were the westward movement of wheat raising, concentration of milling, competition for markets, the shifting preeminence of milling cities, and transportation as an arbiter of milling advantages. Technical matters center on changing mill power arrangements and the introduction of new milling machinery and processes.

4. Determination of integrity requirements

The requirements are based on two aspects of analysis. First is knowledge about the attrition of particular kinds of mills as discussed in historical and milling trade literature. Second are predictions about possible existing mill properties based on characteristics of known survivals identified in the Bureau's site files and those listed in the National Register of Historic Places.

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United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number _____ Page _____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number:

Property Name: Flour Milling and Related Buildings and Structures in Iowa (cover document)

County: NA State: IOWA

Flour Milling and Related Buildings and Structures in Iowa
Multiple Name

This multiple property documentation form is entered in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Linda McClelland — March 29, 2000
Signature of the Keeper — Date of Action

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Amended Items in Nomination:

Pagination. Page numbers are, hereby, redesignated to conform to the National Register Multiple Property Form as follows:

Pages E.14 to E.24 become F.14 to F.24
Page E.25 becomes F,G,H.25
Page E.26 becomes H.26
Page E.27 becomes H,I.27
Pages E.28 to E.33 becomes I.28 to I.33

The Iowa Historic Preservation Office was notified of this amendment.

DISTRIBUTION:
National Register property file
Nominating Authority (without nomination attachment)