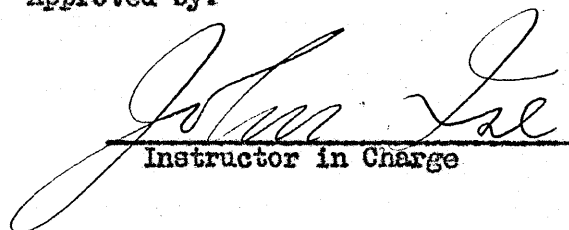


Development of the Flour Milling
Industry in Kansas.

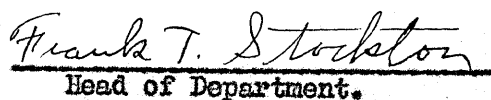
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Head of Department.



Squires

Wind-power Flour Mill, Lawrence, 1863-1905.

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CHAPTER I.

Ancient and Medieval Milling.

Flour milling is one of our oldest industries. The origin of milling goes back for countless centuries, grain unquestionably having been used for food in pre-historic times. Wherever grain was used for food, some method of grinding or milling, in order to make it more palatable for human consumption, was an ever present necessity, although it is probable that when first used for food by primitive man no preparation, either by breaking or grinding, was given it. Some idea of the antiquity of grain growing is obtained from the discovery, in central and western Europe, of wheat stores belonging to Neolithic man, although wheat cultivation has not been traced to the Paleolithic age.¹

Hence, as far back as recorded history goes the growing of grain and its preparation for food by pounding or grinding appear as old established institutions.

Concerning the method of preparing grain for food in pre-historic times there is little known. However, from the stone instruments which have been found, it is known that its preparation, by pounding with stones, did exist for thousands of years before the beginning of recorded history. We know also, from the same relics, that during the many centuries before the dawn of recorded history, the only change which took place in the method of preparation was in the shape of the stone implements used.

The implement first used for preparing grain for human food was apparently a rounded stone about the size of a man's fist with which the

1. H. A. Bellows-"A Short History of Flour Milling, page 3.

grain or nuts, which were prepared in the same manner, were pounded and crushed into a coarse meal. These stones, many of which have been found, were generally of hard sandstone and were evidently used one against another in the process. Such stones have been found in Ireland and in the Orkney islands. They were not uniform as to shape or size, but ranged from the primitive ball-shaped implement to a ^{larger} longer one resembling the pestle of a mortar, which was a later development. The use of these primitive implements is not uncommon, today, in many parts of the world. They were generally used by the North American Indians and have been found in many parts of America.

It is probable that there was little variation, for centuries, either in the type of implement used or in the manner of using them. However, in the course of time the shape of the primitive grinding implement underwent a change. The surface of the lower stone, against which the grain was crushed, became slightly concave, and the pounding stone became more pointed. As this change took place the pounding stone began to be used with a rubbing or twisting motion. The process was, at first, very likely a combination one, the grain being first crushed and then ground into meal. The implement thus evolved was the saddle-stone.

The saddle-stone was the first real grinding implement. Grain was spread on the concave face of the lower stone and was rubbed and ground into a coarse meal. Saddle-stones have been found among the remains of primitive people all over the world and, as in the case of the more primitive grinding stone, is still used in some parts of the world.

It is used in Mexico, where it is called the metata, for grinding maize and is used in South America also.

Flour milling is said to have begun with the development of the saddle-stone. It was the first real improvement in the implements used. Moreover, the grinding process introduced by its development was to last with some variations, to within fifty years of the present time.

Co-incidentally with the development of the saddle-stone, our earliest written records appear, so that we have some definite knowledge of its antiquity. It is estimated that its use goes back in history about four thousand years. Evidence points to its use by both the Chaldeans and the Egyptians, the pictorial records of the latter people giving a very good idea of the process employed by them in grinding grain. However, the most important source of knowledge concerning the use of the saddle-stone by early peoples is the old Testament. The mill-stones referred to in it were, from references and descriptions, undoubtedly saddle-stones.

Concerning the quality of flour produced by the saddlestone, which was used for both barley and wheat, only conjectures can be made. Some investigators maintain that flour, implying some degree of separation from the bran, could not be made with the saddle-stone, while others insist that flour could be produced by its use. There are quite frequent references, in early Greek writings, to flour which was of apparently better quality than that which could be produced by the use of the saddle-stone alone. But there is no evidence that the Greeks possessed any other implements. If a superior flour was produced by them, it was made by a process of which no records have ever been found.

The second step in the evolution of the milling process was the development of the revolving quern. The earliest form of this revolving mill was but little different from the hand mill or saddle-stone. The only essential difference was in the fact that the upper stone of the quern was fitted with handles which enabled it to be revolved. This permitted an increase in the size of the mill since it became possible for more than one person to assist in its operation.

The cause which led to the change from the saddle-stone to the revolving quern was the desire, not to produce a better quality of flour, but to economize power. The back and forth motion involved in the operation of the quern limited its size to that which could be operated by one person. With the beginning of industrial development, labor became more important and the revolving quern did away with the automatic limitation upon size involved in the use of the saddle-stone. It is probable that the application of the principle of rotary motion to milling was first made in Italy between 500 and 250 B.C. For many years the two types of mills existed side by side, but the saddle-stone was gradually displaced by the quern.

Regarding the quality of flour produced in Rome there is definite knowledge. Bolting was a very early development, used not only to produce a fine grade of flour but also to separate the flour from the particles of stone chipped off from the mill stone and to remove the sand which was frequently mixed with the meal to facilitate the grinding process. From the writings of Pliny we have proof of the antiquity of supposedly modern flour grades.

Although there was a great deal of variation in the size and

shape of the mills, in essential features they were all alike and from that time to the commercial development of roller milling there was no fundamental change in the milling process. "The principle of the revolving stone, the use of flat grooved stones and the separation of the products of milling into fine flour, coarse flour and bran were all perfectly well-known to the Romans of Nero's time and thereafter the mechanical growth of flour milling was almost exclusively concerned with the application of different forms of power to the turning of the mill stone".²

The development of flour milling as a business did not take place until after the development of the water-driven mill. The origin of the water-wheel is not definitely known but it is probable that it was first developed in Asia Minor. Its use seems not to have been wide prior to 100 B. C.

The Greeks attempted to apply water-power to flour milling, but the Romans first successfully adapted the water-wheel to the turning of the mill stones. The Greek Water-wheel was placed in a horizontal position and was connected with the upper stone by a shaft passing through a hole in the lower stone. In this form the water mill had a very low efficiency owing to the inevitable slow rate of grinding except on rapid streams. The real adaptation of water power to flour milling was made by the Romans and quite possibly most credit should be given to the engineer and scientist, Vitruvius. Sometime between the years 20 B. C.

2. Bellows-"A Short History of Flour Milling, page 15.

and 11 B. C. Vitruvius wrote a detailed description of a grinding mill, apparently a novelty, which was equipped with a vertical water wheel. The shaft on which this wheel revolved was fitted with a small toothed wheel which in turn engaged a larger one set horizontally. This larger wheel turned the mill. The grain was poured between the stones through a hopper placed over an opening in the center of the larger stone, and the meal was ejected by the rotating action of the stone.

Here we have all the essentials of flour milling as it was practised for some 1800 years, the outstanding features being the vertical water wheel and the gearing. In this early mill the gearing was down, thus making the mill-stone revolve less rapidly than the water wheel, probably taking into consideration the swift current of the Tiber river on which the mill was built; but it was early found that ^{by} ~~the~~ reversing the relative sizes of the cog wheels a slow current could be made to drive a mill rapidly.

By the fourth century of the Christian era, milling had assumed some commercial importance in Rome although the close relationship of the government to the operation of the mills made them of a semi-public nature. But after the invasion of the Germanic peoples the feudal mills, for several centuries, made very little progress except in the larger cities. However, the increasing population of the towns, and the fact that the millers eventually freed themselves from government control brought about a gradual growth in the size and importance of the flour milling industry.

But the greatest development in the industry did not take place until after the invention of the steam engine. This invention not only permitted the construction of much larger mills but it also made possible the location of mills wherever conditions were favorable, without the

necessity of taking into consideration facilities for water transportation. Prior to this time construction of mills to supply more than a purely local trade was impossible because of the lack of adequate transportation facilities, while the uncertainty and inadequacy of water power also served to prevent the development of large mills.

These unfavorable conditions were first remedied in England, hence the development of the flour-milling industry, as it exists today, can be said to have begun there. The patenting of the steam engine by James Watt in 1769 and the application of the steam engine to the locomotive by George Stephenson in 1829 are the dates which mark the real beginning of modern flour milling. With steam power a flour mill of almost any size could be built and operated anywhere; with steam transportation the products of a mill could be shipped, on a competitive basis, wherever a market could be found.

Besides the invention of the steam engine, Watt is also credited with the first practical application of steam power to flour milling. Watt held part of the stock in a mill built by a London company, power for which was provided by an engine owned by himself and a partner. Another improvement of great importance was the substitution of metal cogs for the wooden ones used in mills prior to that time.

This establishment, known as the Albion mill, was very successful from the first. Its flour was of excellent quality and the capacity of the mill was the greatest of any of its time. Notwithstanding the high cost of fuel it could produce flour more cheaply than the other establishments of the time.

This practical demonstration of the success of steam power

mills caused such mills to be built at various places in England and on the Continent as well. The first of these were located in or near large cities, for the transportation problem was not yet solved. But with the coming of the railroad the problem of transportation was solved and the industry was ready for the rapid development which it has since undergone.

CHAPTER II.

Early History of Milling in the United States.

From early colonial days until the latter part of the eighteenth century, the course of development in the flour milling industry in America was similar to the development which took place in England.

Using a classification which had in the past more significance than it has at the present time, milling is of two kinds. The first is characterized by small scale establishments the operations of which are purely local in nature, depending on the local community for both its supply of raw materials and for demand for its products. The second is characterized by large scale establishments which go into the open markets for raw materials and dispose of their products in the markets of the world wherever there is a demand for them.

Milling, during the early years of settlement in America, was of the first kind and for nearly two centuries, following, the history of flour milling was only that of the extension of this first primitive grist-mill development.³

The first water-power mill, if not the first mill in America, was built by George Sandys, a brother of Sir Edwin Sandys, who was a noted figure in the early history of Virginia.⁴ Sandys came to Virginia in 1621 with Governor Wyatt. The date of construction of this mill is not definitely known but it is probable that it was built during the early years of the decade 1620-30.

3. Ninth Census, Manufacture, page 781.

4. Cooke-History of Virginia, page 140.

In 1626 a small horse-power mill was built on Manhattan island and a windmill grist-mill near Watertown, New York two years later. Windmills soon became common along the Atlantic coast. In this connection it may be mentioned that the windmill, as in the case of the water wheel, was developed in Asia Minor. The first windmills in Europe were built about the close of the twelfth century of the Christian era. By 1250 A. D. they were common and during the next century increased in number very rapidly.

In 1649 Virginia was credited with four windmills, five water mills and numerous horse power establishments.

By the middle of the seventeenth century the colonies were raising a surplus of grain above their own needs and had begun an export business of some proportions in wheat and flour with the West Indies and South America. But it was not until the mills began to centralize, and a few large cities had developed as milling centers that the industry really began to shape itself on a commercial basis. The development of milling centers began shortly after the close of the Revolution. The mills of Wilmington, Delaware on the Brandywine river first become celebrated for their flour and export of flour from this city was early begun.

As the frontier was gradually pushed westward, the area of wheat production moved westward also, and there was a gradual shift of the milling industry farther west. Pennsylvania and Virginia were the first important producers of wheat. As the wheat belt moved westward Baltimore, Maryland for a time assumed some importance as a milling center, eclipsing Wilmington.

Although Baltimore for a time became known as a milling center and exporter of flour, principally to the West Indies, it remained for Richmond

Virginia to develop as the first milling center of real importance in America. This city had an ample supply of power from the James river and in 1845 had the largest mills in the United States.

The next city to be for a time the center of the milling industry was Rochester, New York. It retained its importance for a number of years but was later eclipsed by Buffalo. This city, because of its favorable location with respect to water transportation, retained a greater share of the importance which it developed as a milling center than did the other cities mentioned.

Other cities to develop as more or less important producers of flour were Cincinnati and Milwaukee,. Both of these were destined, however, as the wheat belt moved westward, to be eclipsed as milling centers by St. Louis. As the wheat belt extended westward through Ohio, Indiana, Illinois and into Missouri, this city assumed strategic importance because of its location in the wheat belt and on the Mississippi river, at a time when river transportation was of much greater importance than it is today.

This city became a producer of flour about 1840 with two small mills. Because of its location on the westward extension of settlement it soon became the principal city of the west. By the year 1860 the St. Louis mills were making 800,000 barrels of flour yearly and ten years later more than 1,000,000 barrels yearly. The annual production had grown to 2,000,000 barrels in 1880, but the following year its leadership in flour production was lost.

The city which in 1881 assumed leadership in the production of flour in America was Minneapolis. This city is located in a region of

great wheat production. However, the chief reason for its great development as a milling center was the abundant water power which could be obtained from the falls of St. Anthony in the Mississippi river, on which the city is located. It was this combination of large wheat supplies and of cheap water power which resulted in the early development of Minneapolis as a milling center. The leadership in flour production which in 1881 was lost to this city by St. Louis has been retained ever since. In addition to the mills which developed in Minneapolis, others were built in the territory about this city. Duluth, Minnesota and Superior, Wisconsin developed as milling centers, also. This entire region including Minneapolis and surrounding territory is known, in milling circles, as the Northwest.

During the time that this development was taking place in the Northwest, the wheat belt continued to be extended westward. Kansas proved to be especially well adapted to the growth of wheat and within but a short time became one of the leading wheat producing states. Later this state assumed the leadership of all the states in wheat production.

As Kansas forged to the front in wheat production there has been rapid development in the milling industry of the state also. At the present time the state is second only to Minnesota in the production of flour, and Kansas mills are the strongest competitors of the mills of the Northwest in the flour markets of the world.

CHAPTER III.

Early Kansas Mills Before 1860.

The first mills to be located within the present boundaries of the state date far back in the early history of the region west of the Mississippi river. However, with but one exception, all of the mills which were built prior to May 30, 1854, when Kansas territory was opened to settlement, were constructed by the government for the use of the Indians. In order to encourage the migration of Indians to the west from states farther east, and in payment for the lands given up by them, which it was desired to open to white settlement, the Federal government gave them stock, rifles, blankets, etc., and in some cases money. In addition, certain of the treaty agreements made with them stipulated that the Government should erect grist mills for the use of the Indians in the territories to which they moved in the west.

Government Mills

A treaty of August 8, 1831 providing for the removal of the Shawnee tribe of Indians from their reservation in Ohio to lands subsequently decided upon south of the Kaw river and next to the Missouri state line, included provision for the construction of what was in all probability the first mill in the region which later become the state of Kansas.⁵ The treaty between the government and the Shawnee tribe provided that the government should build a good saw-mill and a grist-mill containing two

5. Treaty with the Shawnee tribe. U. S. Statutes-at-large, volume VII, page 356. Article IV. "Out of the first sales to be made of the lands here-in ceded by the said Shawnees, the U. S. will cause a good and substantial sawmill and a grist-mill, built in the best manner, and to contain two pairs of stone and a good bolting cloth to be erected on lands granted to the said Shawnees west of the Mississippi, and shall be solely for their use and benefit."

pairs of mill-stones and a bolting cloth.

That a mill was built in compliance with the terms of this treaty is certain, but unfortunately the exact date of its construction cannot be learned. Frequent references to this early mill are made in accounts concerning old Shawnee and Shawnee county, but the date of its construction cannot be learned from those accounts. The mill was not long in operation, the great flood of 1844 carrying it away from its location on Mill creek, a small stream which flows almost due north of Olathe into the Kaw river.⁶

The small station of Choteau, on the Santa Fe Railroad, which is 10.5 miles from Argentine station Kansas City, Kansas, is just a short distance west of where the railroad crosses Mill creek. The First Biennial Report of the State Board of Agriculture contains a brief reference to this mill, stating that it was the first mill to be located west of the Missouri river.⁷ No indication is given, either in this or in other references to it, that it was ever rebuilt and the probabilities are that it was not.

Although the exact date of its erection is largely conjectural, it is probable that it was built not later than 1835. The Shawnees began to migrate to Kansas in 1832 and their removal from Ohio was probably completed within the following two or three years. It is practically certain that this was the first mill to be built within the present boundaries of the state.

Another early Indian mill was provided by treaty agreement with the Iowa and Sac and Fox tribe. This treaty merely stipulated that the

6. Blair, "History of Johnson County, Kansas"-page 24.

7. "Shawnee is the oldest settled locality in Kansas and here the first mill west of the Missouri river was located; it was washed away by the great flood of 1844." - First Biennial Report K.S. B. of A. 1877-78, page 253.

government should furnish the tribe in question with a grist mill.⁸ So far as can be learned, this mill was the first to be erected in Doniphon county. It was built on Mill creek (not the stream upon which the mill in Johnson county was built) where it flows into Cedar creek above Iowa Point, at a cost of \$2,800. It was later burned.⁹

Several years ago a set of old mill stones were found near Troy Doniphon County and the suggestion was made that there might be some connection between the stones and the explorations of the Missouri river valley by Coronado in 1541, or the explorations of Cortez. Other theories advanced were that the stones were relics of an adventurous trapper or Catholic missionary, or that they might have been abandoned by early voyagers on the Missouri river.¹⁰ However these theories were all later exploded. The mill in which the stones were originally placed was built, according to an early resident of Troy, by the United States Government at the solicitation of S. M. Irvin, who was for several years Indian agent at Highland, and had charge of the Indian mission at that place in 1844 and 1845. The mill was burned by the Indians in 1853 when they learned that the territory was to be opened to settlement, probably to prevent it from falling into the hands of white settlers.¹¹ Possibly because they were located near each other, accounts concerning this mill and the Iowa Point mill described above, are confused.¹² The date of establishment of

8. United States Statutes-at-large, vol. VII., p. 511.

9. Kansas Historical Collections, vol. XII, page 53.

10. An account of their finding appeared in the Kansas City Journal Post, October 29, 1906.

11. A. P. Groves in the Troy Chief, November 25, 1906.

12. However there is quite conclusive evidence that there were two mills, although confusion of the two in accounts of them leads to distrust of the accuracy of the accounts.

neither mill is definitely known. By 1857 the Iowa Point mill had been burned and only pieces of the old mill stones were to be found, according to a pioneer citizen of the county who visited the location of the old mill in that year.¹³

A treaty with the Kickapoo tribe of Indians of October 24, 1832, also provided for the erection of a mill for the use of the tribe on lands to which they were removed northwest of Leavenworth.¹⁴ No definite information concerning this early mill can be obtained.

Indian Mission Mills.

However, the mills built by the government in compliance with treaties with the Indians were not the only early mills to be built within what is now the state of Kansas. Others, likewise built for the use of the Indians, were constructed through the activities of various church bodies at the Indian missions established at different points.

The establishment of Indian missions in the state began with the founding of a Presbyterian mission among the Osage Indians on the Neosho river in 1824.¹⁵ But this and others of a similar nature were subsequently abandoned. There is no evidence to support such a belief and it is improbable that any of these earlier missions were provided with mills.

The mission which had most interest to the history of milling in the state was the old Shawnee Methodist mission, which in 1829 was established a few miles southeast^{west} of where Kansas City now stands. Ten

13. Hiawatha World- (date undetermined)- Doniphan County Clippings--Kansas Historical Collections.

14. Treaty with the Kickapoo tribe of Indians, October 24, 1832. Article IV. "The United States agrees to pay \$3,700 for the erection of a mill and a church for the use of the aforesaid Indians on the aforesaid lands."- U. S. Statutes-at-large, Vol. VII, p. 391.

15. Kansas Historical Collections, Vol. XII, page 67.

years later a Manual Labor School for the Indian children of the tribes about the mission was added. But before the Manual Labor school was constructed, the mission was removed to a point a few miles southwest of its original location. Here brick kilns were set up to provide bricks for building the school, blacksmith shops were built and a stream flouring mill was put in operation. There is no definite information as to the size or type of this mill, but it was probably only the ordinary grist mill, such as all pioneer establishments were. Reports of its Superintendent to the United States Commissioner of Indian Affairs indicate that it was used extensively by the Indians.¹⁶

Although it is not improbable that grist mills of some description or other were built at other missions, there are no available sources of information concerning them. It is quite certain that the Shawnee mission was the first to establish a mill; it is of interest chiefly because of that fact, since neither it nor the mills established by the government in conformance with treaty agreements were established as commercial enterprises. Their establishment does not mark the beginning of the milling industry proper, although, with but one exception, they were the only ones to be found within what is now the state prior to the opening of the territory to settlement.

16. "Our mills and shops are doing well affording considerable assistance to the Indians around in various ways -- of the mills I must speak more definitely. There has nothing been done for the Indians in all this section of country in the way of improvements which is of equal importance, or anything like equal importance, with the existence of the steam flouring mill at this place. Here the Indians from several tribes around get a large quantity of their bread stuffs such as flour and corn meal. The mills, and especially the saw mills, offer to them inducements to industry. We purchase from the Indians all our saw logs, giving them in return, flour." --Report of Supt. Wm. Patton to Wm. Medill, Commissioner of Indian Affairs. Report of the Commissioner of Indian Affairs 1846, page 365.

On May 30, 1854 Kansas was opened to settlement and pioneers began to rush into the territory. One of the first thoughts of the settlers in a new community was for a means to provide themselves with bread. Mills meant bread and hence were among the first necessities to be provided for. With the establishment of mills to supply the needs of the pioneers for flour and meal, the Kansas milling industry may be said to have had its beginning. During the first few years the rush of settlement into the eastern part of the state was very rapid and between 1854 and 1860 a considerable number of pioneer grist mill establishments were located in the region.

The importance of the early grist mills to these pioneer communities can hardly be over-estimated, for upon them in so small measure depended the success of the hardy pioneers in establishing homes in the new country. It has been said that these early mills were not only the forerunners of, but also the cinch straps of civilization, along with the log school house and the church.¹⁷ With the increase of population and the expansion of the settled area westward, the number of mills increased.

These early mills, constructed to meet the needs of pioneer settlers, were ordinarily combination affairs, a saw-mill being operated in connection with the grist mill. Next to his need for breadstuffs, the most urgent need of the pioneer was for materials with which to construct his home. Timber was fairly well distributed over the eastern part of the state, and the early mills were usually established where timber was available, in many cases, along the banks of streams.

17. Kansas City Journal Post, Dec. 10, 1922.

By far the greater number of these early establishments were operated by water power. The eastern part of the state contains, or contained, numerous streams which were of sufficient size to meet the limited power requirements of the early mills. Many of the pioneer establishments were built on the banks of small rivers and creeks, across which dams were thrown and water-wheels constructed to utilize the fall. These water-mills were more cheaply constructed, cost less to operate and were, with the exception of their susceptibility to damage from floods, as satisfactory as steam-power mills. In addition to the greater cost of equipment for the steam mill, the difficulties involved in transportation of the engine and boiler were very great. Railroads were as yet unheard of in the region, roads were at best merely trails and with the exception of the Kaw river, on which there was some steam-boat traffic during early pioneer days, there was no water transportation. The experiences of the builders of the first saw mill in Topeka is suggestive as of the extremities to which the pioneers were forced by this problem of transportation. There was no road between Kansas City, from which the mill equipment was brought, and Topeka and the difficulties involved in transporting the heavy boiler over the prairie, by wagon, were too great to be overcome. Consequently the boiler for the engine was sledged over the snow covered ground of winter time, from Kansas City to Topeka.

There are no data available from which an estimate of the relative proportions of water power and steam-driven mills, during the early years, can be made but undoubtedly the water mills outnumbered the steam mills very greatly. Indeed it has been said that the early history of

milling in Kansas is that of the Yankee miller who built his water power on such^a stream as the Missouri, the Kaw, Republican, Smoky, Blue or Neosho river, and ground the grain of the settlers who came to his mill.¹⁸

Not only was the pioneer miller indispensable to the new settlement, but he often anticipated the demands for his services and preceded actual settlement. Civilization has often a tendency to put the cart before the horse and as settlement pushed westward, the pioneer miller as a rule searching for a spot where he would be assured of sufficient water-power, set up his mill and was followed by the pioneer farmer who produced the grain for his mill. Wherever the hum of grist mills was heard the eastern and northern settlers staked their claims and began the work of making homes.

These early mills ground more corn than wheat. Probably the chief reason why corn was raised almost exclusively during early years was the fact that much less labor is required to raise it than is required to raise wheat. Moreover, more implements were required. Still another reason, perhaps, was the failure of the early settlers to perceive that the soil would grow wheat more successfully perhaps, than corn. Many of them came from sections of the country where corn was grown to a much greater extent than wheat and it is not improbable that many were actually unfamiliar with the growth of wheat.

All of the early mills were "custom" mills, that is the miller ground the grain which the farmers brought to the mill, retaining for himself a share of the meal or flour, or charging the farmer a certain amount per bushel for grinding it. In some cases a toll of from one-eighth to one-twelfth of the grain was taken by the miller; in others,

18. Kansas City Journal Post, Dec. 10, 1922.

the settler's grist was ground and a fee of from 25 to 35 cents per bushel charged.¹⁹

Early Commercial Mills

With but one exception, as noted above, the establishment of mills as a result of individual initiative, and as commercial enterprises did not begin until after the territory was opened to settlement, May 30, 1854. The one mill which was established before that date was located in Wyandotte, now Kansas City, Kansas, and was built in 1852.²⁰ The builder and owner was one Mathias Splitlog, an Indian and adopted member of the Wyandotte tribe. The mill was a rather sorry affair, even in those days, of the rudest construction and operated by horse power, instead of by water-power as given in some accounts. Mr. William E. Connelley, Secretary of the Kansas State Historical Society, knew Splitlog and from him obtained first hand information concerning this historic old mill. It was located on what for years was known as Splitlog's Hill, later the site of the S. A. Cobb residence in Kansas City, Kansas. This mill was undoubtedly the first mill to be built by individual initiative within what is now the state of Kansas. Later in 1858 John McAlpine and James Washington erected the first steam flouring mill in Wyandotte County.²¹

19. Kansas Historical Collections, vol. XII, page 53.

20. Wm. E. Connelley-Secretary Kansas Historical Ass'n. For an account of this old mill, and of its builder and owner Mathias Splitlog, see article by Wm. E. Connelley in Kansas Historical Collection. Vol. XI.

21. The Wyandotte Herald, March 20, 1879.

The first mill to be built in Kansas territory, before it became a state, was constructed in 1855-56 at Palermo, on the Missouri river, twelve miles below St. Joseph Missouri.²² The builders and owners were F. M. Mahon and William Kimber, the firm name being Mahon and Kimber. Concerning this mill not very much is known although it did quite a large business during the early years. It was a combination affair, operating what was one of the first saw-mills in the country in connection with the flour mill.

Another pioneer mill of Doniphan County was built in 1856-57 by J. W. Farmer on Spring Creek. The exact location is unknown. Two years after it was built, when the little settlement of Doniphan was in the height of its prosperity, this mill, the only one that the town ever had, was burned.²³

In Leavenworth County the first grist mill was built in East Leavenworth or "Slabtown" as it was called, in December 1854 or January 1855 by Panton and Yohe.²⁴

22. "I built the first flour mill that was ever built in the territory of Kansas before it became a state. This was, I think in 1855-56. When the lands of the territory of Kansas were thrown open for settlement, I with my father-in-law, Mr. William Kimber, and brother-in-law, W. J. Kimber, took up land and located the town site of Palermo, in Doniphan County, Kansas, twelve miles below St. Joseph, Missouri. My partner in the mill was Wm. Kimber and the firm name, Mahon and Kimber. Adjoining the flour-mill, which was a two story building we had also a flour mill, which was, I believe the first in the territory. The mill was a convenience to settlers in Doniphan and adjoining counties, and the mill was crowded with farmers from all over these counties." -- F. M. Mahon in Kansas Historical Collection. Volume XI, page 9.

23. Atchison Globe April 10, 1907.

24. Cutler, History of Kansas, page 428.

The following advertisement appeared in the Kansas Weekly Herald (Leavenworth) early in 1855:

"Steam Saw and Grist mill".

They will also grind corn on the most reasonable terms. Panton & Yohe.

The first mill in Leavenworth was built in 1857 by Erie and Dunbing on the Northwest corner of Main and Short streets. This mill had three or four sets of mill-stones or "buhrs" and all necessary machinery for making first class flour. Prior to that time all the flour used in Leavenworth and vicinity was brought from Weston or Platte City, Missouri, or shipped in by steamboat. Owing to the scarcity of wheat in that vicinity and the large capital required to enable it to compete successfully with the mills in Missouri, this mill failed to prove a paying investment.²⁵

The first mill in Topeka, and probably Shawnee county, was put in operation in December 1856, in connection with a saw mill, Abel Merrill, H. W. Farnsworth and S. F. Walkeley being the proprietors.

Its location was on the northwest corner of Kansas Avenue and First Street.²⁶ In 1861 another mill was built, this one being located on the corner of Kansas Avenue and Third Street. This mill was subsequently enlarged in 1868 and later became known as the Shawnee Milling Company. In 1871 J. L. Shellabarger, and J. P. Griswold took charge of this pioneer establishment, under whose management it remained for nearly forty years.

So far as can be learned there was no grist or flour mill in Lawrence before 1860. However, there were small establishments located

This mill was built before that of Mahon and Kimber at Palermo and disproves Mahon's statement that the mill at Palermo was the first in Kansas territory. However, it is probable that the mill at Palermo was the first to manufacture a product of flour quality. The difference between a grist mill and a flour mill was that in the former facilities for "bolting" were limited, only a coarse meal being produced. The larger mills as distinguished from the small grist mills produced a finer quality of product with better bolting facilities.

25. H. Miles Moore, History of Leavenworth, page 193.

26. Fry W. Giles, "Thirty Years in Topeka", p. 42.

elsewhere in Douglas county. One of the earliest ones, concerning which we have definite information was built at Blue Mound, a natural elevation seven miles southeast of Lawrence, in 1857. This mill was probably the first to be built in Douglas county.²⁷ A mill was built in Eudora during 1857 also, but no information is available concerning it.²⁸

The mill at Blue Mound was built on Wakarusa creek near Blue Mound, by John W. Willey and his son who came to Kansas from Indiana. It was a combination grist-mill and saw-mill providing lumber and shingles for the settlers to use in building their homes, in addition to grinding their grain.

This mill is said to have had all the necessary machinery for producing bolted flour and was very probably the first in the county to be so equipped. It did a large business for that time, farmers coming to the mill during early days for many miles.

27. Milling and Grain News, a Kansas City publication, made an investigation several years ago, as a result of which it was stated in the issue of January 7, 1909 that this mill at Blue Mound made the first bolted flour in the state. This, however, was not true, as the mill of Mahon and Kimber doubtless made bolted flour, while there were many establishments built prior to 1857. Among which there were certainly some that bolted their product. It will be recalled that the treaty which provided for the first mill built by the government for the use of the Indians included provision for "a good bolting cloth."

The location of this mill was on the farm owned in 1909 by Robert Irvin. Mill machinery was hauled overland from Kansas City to which it had been shipped by boat from Indiana. --Milling and Grain News, Jan. 7, 1909.
28. Culter's History of Kansas, page 1883.

CHAPTER IV.

Growth of the Milling Industry in Kansas 1860 - 1874.

From 1860 to 1874 were the pioneer years for the milling industry of the state. Mills built during this time were, for the most part, pioneer establishments such as were described in the preceding chapter. In the later years of this period there was some improvement in methods of manufacture and an increase in the size of milling establishments, but these larger mills were confined almost entirely to the larger urban communities.

The most marked development which took place in the industry during this time was the large increase in the number of small mills, which multiplied very rapidly as the population of the state grew and settlement was pushed farther into the interior of the state. Early census reports referred to the milling industry as being in the "neighborhood industry" stage of development. The mills did a purely local business, although many of the pioneer establishments served a territory many miles in extent. The uncertainties of pioneer life caused many of these establishments to have but a fleeting existence, and there were undoubtedly many which rendered a great service to the pioneers of early days, concerning which there is now no available information. Many were built during

these early days to meet purely local needs, served well that purpose, and with changing conditions were dismantled and abandoned.²⁹

There are no statistics on milling in Kansas prior to the year 1860. In that year the Eighth Census of the United States; which was the first to contain information concerning Kansas territory, made the first survey of the milling industry. This is the first definite information on Kansas mills.

On that date there were 36 grist mills reported in fourteen counties of the state.³⁰ The number of mills in each county varied from one each in Wyandotte, Breckenridge, Butler, and Madison counties to five each in Jefferson and Franklin counties, with an average of from two to three mills per county. Madison and Riley were the two counties farthest west to report mills, the larger number of mills being, as would be expected, in the counties in the eastern and northern part of the state.

The total capital investment in the 36 mills reported was \$107,750., an average of approximately \$3000. per mill.

The capital investment per county varied from \$1000. in Butler

29. Kansas Historical Collections. Vol XII. p. 52.

30. Twenty-two (22) counties reported concerning mills. Twenty (20) did not, these counties being, Arapahoe, Anderson, Chase, Clay, Dickinson, Dorn, Godfrey, Greenwood, Hunter, Jackson, Johnson, Marion, Marshall, McGhie, Nemaha, Otoe, Pottawatomie, Shawnee, Washington and Wilson. Had reports been received from these, the total number of mills, as reported by the census undoubtedly would have been greater.

county to \$33,700. in Franklin, the average per county being \$7695.

The value of materials used by the industry was \$160,432. or an average of \$4456. per mill. This varied from \$1950. in Riley county to \$44,500. in Douglas county.

Of the twenty-two reporting, four counties, Douglas, Doniphan, Coffee, and Franklin, in the order named, led all of the others in value of products. In fact these four counties produced a value of \$243,417 of the total value of \$293,841.

Some mills, notably those in the four counties named above, did a relatively large business. The mills of Douglas county, three in number, had an output amounting to \$100,500., or an average of \$33,500. per mill. There was but little relationship between the value of products and output per mill. Coffee county with four mills, but a capital investment of only \$9,000., had an output valued at \$48,650. Douglas county with a reported capital investment of only \$16000. had an output greater than one third of the total output for the state. On the other hand, Jefferson county although having a capital investment of \$17,000 had an output valued at only \$13,004.

The reason for the wide variation in amount of business done yearly was not, in a very large measure, the result of greater capital investment, but of the fact that many mills run only part time, while others run steadily, in some cases running day and night. How steadily a mill was operated depended

upon the supply of grain and demand for the products of the mill. The leadership of Douglas county in 1860 resulted from the fact that settlement about Lawrence was very rapid during early years.

Although as a rule settlement was not far in advance of the pioneer miller, mills were far from numerous, especially on the frontier of settlement. Settlers were often put to considerable inconvenience and hardship to obtain flour and meal. The following account of conditions which existed in an early settlement is illustrative of the hardships caused by the lack of milling facilities:

"As soon as corn had become hard enough to be grated, holes were punched in the bottoms of tin-pans and the corn was grated from the cob. Previous to that time Absolom W. Hoover had made a hand-mill of sand stones. After the corn became ripe and hard this mill was kept running constantly, settlers coming many miles to grind their corn there." 51

The hardships occasioned by the lack of milling facilities on the frontier were greatest in the central part of the state west of Topeka for it was in this direction, up the valley of the Kaw river and its tributaries that settlement was most rapid in the decade from 1860 to 1870. "For nearly ten years, (dating from 1856) although conditions improved wonderfully they were still far from satisfactory." 52

51. Cutler's History of Kansas. page 1531.

52. Kansas Historical Collections. Vol. XII. Page 54.

An experience of Mr. C. Hoffman of Enterprise, which may possibly have influenced him a few years later to become the pioneer miller in that section of the state, is typical of experiences of many others. In 1866 he went to Council Grove, from Enterprise, with a load of wheat to have it ground into flour. On arriving at that place he found the mill closed and had to drive on to Burlingame, making a total distance of about two hundred miles to secure flour for family use. It was not uncommon for farmers living on the outskirts of settlements to drive from fifty to one hundred miles with their grain to get it ground into flour.

The summer months were the busy ones for these pioneer establishments. The trip to the mill was often a long one. There were no roads, and consequently the farmer obtained the bulk of the supplies which would be required through the winter months when the hardships of the trip would be least severe. During the busy season for the miller it was not unusual for as many as a dozen farmers to be awaiting their grists at the same time, during which time they camped by the mill until their turn came. Many of the pioneer millers provided camping grounds with houses for the use of the settlers who had to wait their turn to have grain ground at the mills.

Although settlement began with a rush when the territory was officially opened May 30, 1854, conditions were not

favorable for, nor was there a great deal of progress made prior to 1865. Political difficulties made pioneer life uncertain and dangerous, and not only served to retard the development but even caused a backward movement, for the population prior to the close of the war was a fleeting one. Even prior to the outbreak of the war political difficulties and border warfare impeded progress. The development of the milling industry was dependent upon the growth of grain which supplies the mills with their ^{raw materials} products. During these years when the defense of homes and the war took a heavy toll of man-power, only such supplies of grain were raised as were absolutely required.

However there was still another reason why it was impossible for much progress to be made in the development of the milling industry until close to the year 1870. This was the lack of transportation facilities. In the absence of any other influences retarding industrial development this very severe handicap would have effectually prevented any substantial development.

The first railroad in the state, which was but a few miles in length, was built in 1860.³³ However the real beginning of railroad construction came after the close of the war. In 1865 there were only about 40 miles of railroad in the state,

33. F. E. Wolf - Railway Development in Kansas. page 59.
M. A. thesis, University of Kansas.

the Union Pacific railroad having been completed from Wyandotte, now Kansas City ^{to Lawrence} Kansas a year before. During the year 1866 about 133 miles were built, and for the next few years railroad construction was pushed rapidly. In 1869 there were over 600 miles of railroads in operation, chief of which were the eastern division of the Union Pacific, which had been extended nearly to the western boundary of the state and the central branch of the Union Pacific which had been completed from Atchison to Waterville in Marshall county, a distance of 100 miles. A number of other railroads were in process of construction, among which were the Santa Fe, and by the end of the year 1870 there were about 900 miles in operation.³⁴ Construction was pushed so rapidly that by the end of the year 1872 there were 2063 miles of road in operation.³⁵ The following year railway construction was stopped temporarily by the panic of 1873 which was in fact partly caused by general over-expansion of railroads.

Before the construction of railroads removed the severe handicap imposed by lack of transportation facilities, mills could not be otherwise than small establishments dependent upon the local community for both its supply of raw materials and ³⁶

34. Public Documents of Kansas, 1870. page 15.

35. Poor's Manual of Railways 1872. page 951.

36. A wheat farmer wrote in 1865: "There is but one drawback to wheat raising in Kansas; that is the want of a market."

Kansas Historical Society Publications. Vol. I. page 183.

for a demand for its products. These limitations upon the development of the industry were gradually removed as railroad extension was continued. But for many years the small local establishment held its own, for a great majority of the settlers were still removed from transportation facilities, and mills built in communities not yet served by railroads were not affected by their construction. Consequently, at the very time when railroad construction was removing the handicap of lack of transportation facilities, the number of small mills was increasing very rapidly, as the population of the state increased. But in the rapidly growing urban communities the effect of railroad construction was, as we shall see later, to bring about the building of larger and larger mills which were not dependant upon local supplies of grain, and which sold their flour wherever there was a market for it that could be reached by railroad.

In 1860 practically all of the 36 mills reported by the Eighth Census of the United States were confined to the region east of Topeka. However, the ten year period from 1860 to 1870 saw the construction of pioneer milling establishments far within the state, as the tide of settlement beginning after 1865 pushed rapidly westward.

One of the earliest mills to be built west of Topeka was the Soden mill in Emporia which is especially worthy of mention, not only because of the fact that it was a pioneer

establishment. but also because of its continuous operation to the present time by the same family . Cutler's History of Kansas states that the first flour to be manufactured in Lyon County. was at the pioneer milling establishment of W. T. Soden near Emporia. ⁵⁷ The first mill built by Mr. Soden, and the one referred to in Cutler's History, was located in Pike township now Cottonwood township in Lyon county. Nothing is known about this first mill other than that it was a grist mill such as was usual at that time.

In the spring of 1860 he sold this mill and went to Emporia where he built the Emporia Water mill on the Cottonwood river. ⁵⁸ During the years 1859 - 1860 there was a very severe drouth. At that time the Cottonwood was almost dry and Mr. Soden built his dam across a practically dry river bed. However,

57. Cutler's History of Kansas. page 851.

58. Kansas Historical Collections. Vol XII. page 54.

There is a disagreement between this account and an article concerning the establishment of the Emporia Water Mill which appeared in the Oct. 31, 1922 issue of The Southwestern Miller. According to this article, purported to be based on an interview with the son of the founder, W. T. Soden began erection of a dam on the Cottonwood river in 1859, the Emporia Water Mill beginning operation, according to the article, in 1860. Nothing is said in this article concerning the earlier establishment in Cottonwood township.

his foresight was rewarded as the water-power site of the Emporia Water Mill, during later years was to become one of the most valuable in the state.

This establishment had four "runs" of stone buhrs and one corn buhr. Walnut girders were used in its construction, the marks of the axe-men being visible on them, some of which are still in the mill. The Soden mill has been operated steadily since 1860.

This interesting account of the old mill camping ground provided by the proprietor of this mill for the use of his customers, appeared in a recent issue of The South-western Miller:

"Among the beauty spots of Emporia that is a source of recreation for the city and for visitors is Sodens grove which is a part of the history of the Soden milling activities. It is a wooded tract of 27 acres adjoining the family mill. When the mill was erected the territory around Emporia was populated largely by Indians and Quakers. They came with ox-teams from points as far distant as one hundred miles to patronize Soden's grist mill when it started business in 1860. Some of the patrons believed that September and March were the only months in the year in which to grind their grain provided it was done when the moon was in the right position to avoid

insects and spoiling. As entire communities often came at one time for their grist it was necessary for the Emporia Water Mills to provide a camping ground. The wooded tract that is now Sodens grove was purchased from settlers who had obtained the land from the government. Three small houses were built on it for the mill's customers who were permitted to occupy them while they awaited their turn to have their grain ground. Many of the Indians who came for grist slept in teepees using the houses provided for them to shelter their horses." 59

Undoubtedly the most interesting, because of its unusual construction, of all the early mills, was the old Lawrence Windmill built in 1863 which was, so far as can be learned, the first mill to be built in Lawrence. A Swede by the name of A. Palm moved to Lawrence in 1863 and conceiving the idea of utilizing the wind in the operation of a mill set things in motion for the construction of a wind-power mill. Interested with him in this venture was a Yankee, John H. Wilder, and these two through the aid of a Mr. Trask, editor of the first newspaper, obtained a loan of \$10,000 from a London capitalist. Twelve Swedes to build the mill were brought over from the old country and construction had

59. The Southwestern Miller, October, 31, 1922.

begun on the mill, the site of which was about a mile west of the main part of town, at the time of Quantrill's raid. Although destroyed at this time construction was begun immediately again and the mill began operation in the same year, 1863.

The mill resembled very closely a typical old Dutch windmill. The top of the mill was movable and a windlass was used to turn the 80-foot wheel so that the sails would catch the wind. The height of the tower was seventy feet, being forty feet in diameter at the base and decreasing to only twenty feet at the top. The lower part of the mill had four-foot walls of hewn stone.

The two buhrs, one for corn and one for wheat, each of which would grind about twenty bushels per hour were on the first or ground floor while the bolting machinery was on the second, and up another flight of steps were the wheels that transmitted the eighty horse power of the arms to the machinery below.

The mill was operated on an average of about one half ~~full~~ time. It was in operation continuously as a flour and feed mill, with the exception of a few years when it also furnished power for a plow manufactory, most of the time until 1895. From that date on it was unused and remained only as a landmark until 1905 when it was destroyed by fire. ⁴⁰

Prior to the building of the old Lawrence Wind-Mill

40. Sixteenth Annual Report. Kansas Bureau of Labor. page 173-174.

a flourishing mill was built in Atchison, in 1861, by the one time United States senator S. C. Pomeroy, which has erroneously been said to have been the first flour mill in the state.⁴¹ Mr. Pomeroy was at that time located in Lawrence as the agent of the New England Emigrant Aid Society. The old town company of Atchison, desirous of making their town of more commercial importance than Lawrence, which was at that time one of the leading towns, induced him to build a flouring-mill in Atchison. This old mill, called because of its location, the Ferry mill, was twenty-five feet wide by seventy-five in length and consisted of two stories and a basement. The machinery consisted of two boilers and an engine, one set of flour buhrs and one of corn buhrs, and had a capacity of twelve bushels per hour. Its cost was estimated at \$5000. This mill after being sold to a Mr. L. Higbee finally passed into the hands of Woodward and Bowman, a well known milling firm of Atchison.

Another pioneer establishment which was probably longest under the active management of its builder, of any of the older mills of the state, was the Perry Hutchinson mill at Marysville. This mill was built in 1864, and was operated by water power from the Blue river. On the first floor was a sawmill, while on the second floor were two run of stone upon which custom work was done. The capacity was 300 bushels every 24 hours. In 1867 the mill was rebuilt and a year later, by the

41. Sixteenth Annual Report. Kansas Bureau of Labor. page 172.

addition of more stones to the mill, its capacity was increased to 125 barrels of flour per day. ⁴²

During the latter years of the decade 1860 - 1870 the rapid extension of settlement westward led to the establishment of mills farther and farther west.

One of the first mills west of Topeka and at the time of its construction the farthest west of any in the state was put in operation at Milford in 1866. In 1855-56, the New England Emigrant Aid Company sent several steam mills to Kansas, which were located at points promising to be business centers. The largest and best was sent to Quindaro, an early day settlement on the Missouri river north of Kansas City a few miles. In the spring of 1858 the Bachelder Town Co. (now Milford) made a deal with the Aid Company whereby they secured this mill machinery at Quindaro giving in return a share in the townsite.

Some pieces of the milling machinery were so heavy that it was impossible to haul it by wagon over the trails which served as roads. Fortunately the Kaw river was then a navigable stream and a steam boat was secured to bring the machinery to Manhattan and unload it on a sand-bar up the Blue river some eighty yards from its mouth. From there it was taken across country to its final destination on the Republican river. Here it was sold and was set up and operated as a sawmill for the

next three years. In 1863, Mr. A. B. Whiting, later of Topeka, bought the plant under contract to build and operate a flouring mill at that place. In the fall of 1866 the mill with a capacity of 300 bushels of wheat per day and more corn was put in operation. This mill ran night and day a great part of the time and for the next nine years made but one shut-down of over two weeks in length. Compared with the mills which were built later, this mill was but a small affair but under the frontier conditions then existing no other mill in Kansas ran so continuously or drew patronage from so large a territory as this mill in Milford in the late 60's.

Another early western mill whose owners played very important parts in the development of the Kansas milling industry was the Hoffman mill at Enterprise, which was the first mill to be built in Dickinson county and at the time of its erection the farthest west of any in the state.⁴⁵ The mill was built on the banks of the Smoky Hill river and was operated by water power obtained by placing a dam across that stream. It was a typical buhr mill with a capacity of forty barrels of flour per day.

At the time of its construction in 1868-1869 the country around ^{Enterprise} ~~Enterprise~~ was very sparsely settled and people wondered at the venture. However the foresight of its builder was rewarded and this mill grew to be one of the most important milling establishments in that part of the country. As in the case of other

45. Sixteenth Annual Report, Bureau of Labor. page 181.

pioneer establishments, it served a territory many miles in extent. At a later time the services of this pioneer firm of C. Hoffman and Sons, to the farmers, as well as to the millers of the state, were responsible in no small measure, for the development of the industry.

There was very little development in the industry during the earlier years of the decade from 1860 to 1870, although towards the end of this period activity in mill construction increased. Holland's Kansas-Nebraska State Directory, published in 1866, contained the names of forty-four Kansas milling establishments.⁴⁴ Emporia led in number of mills with four mills listed. Three Leavenworth mills were listed, while five other towns were represented by two each.

By 1870 the number of mills in the state as reported by the Ninth Census of the United States reached 106, an increase of nearly 200% over the number reported in 1860. Flouring or grist mills were reported in 29 counties, varying in number from only one each in several counties to eight in Doniphan county.⁴⁵ The total capital reported amounted to \$1,056,800, an average of somewhat less than \$1000 per mill. However the capital investment per establishment varied widely, ranging from \$2000 as the reported capital of the mill in Morris county to \$40,000 in Pottawatomie

45. Only counties in which gross production reached \$10,000 were included in the list reported in the census. The list excluded the grinding of grist at the ordinary grist mill, if ground for individual owners and not at the venture of the proprietor of the mill. Hence the number of counties in which there were mills was undoubtedly greater than the list of 29 given by the Census. However, the figure given for total number of establishments, 106, included all mills of whatever type. Ninth Census of U. S. Vol. III. p. 537.

44. Kansas Flour Mills 1866.

p. 224. Holland's "Kansas and Nebraska State Directory."
T. A. Hollands and Co., Leavenworth.

Firm name	Location	County
1. Butcher, Thomas	Atchison	Atchison
2. Merkel, P.	Baldwin City	Douglas
3. Leonard, M. R.	Bazaar	Chase
4. Schulyer, Philip C.	Burlingame	Osage
5. Stow and Fraker	Burlington	Coffee
6. Grimes and Co.	Burlington	Coffee
7. Oursler, R.	Circleville	Jackson
8. Puthey, James	Coloma	Woodson
9. Kyes, John	Coloma	Woodson
10. Mather and Simcock	Council Grove	Morris
11. Armor, Thomas	Emporia	Lyon
12. Button, C. A.	Emporia	Lyon
13. Humphrey, G. D.	Emporia	Lyon
14. Soden, W. T.	Emporia	Lyon
15. Durr and Witt	Eudora	Douglas
16. Stringfield and Stumbs	Falls City	Richardson
17. Brown, John M.	Fort Lincoln	Bourbon
18. Fort Scott Mill Co.	Fort Scott	Bourbon
19. Walker and Son	Granada	Nemaha
20. Legler and Co.	Grasshopper Falls	Jefferson
21. Miller, James	Grasshopper Falls	Jefferson
22. Smith, J. H. and W. A.	Greely	Anderson
23. D. R. Hovey	Iola	Allen
24. Jones and Brothers	Iola	Allen
25. May, Israel	Iowa Point	Doniphan
26. Lawrence Mfg. Co.	Lawrence	Douglas
27. Koehler, Philip	Leavenworth	Leavenworth
28. Spratley, J. W. and Co.	Leavenworth	Leavenworth
29. Wilhite and Bros.	Leavenworth	Leavenworth
30. Hecker and Co.	Lincoln	Nemaha
31. Roock, William	Mapleton	Bourbon
32. Hutchinson, Perry	Marysville	Marshall
33. Deland, E. A.	Mound City	Linn
34. Gross and Clark	Neosho Falls	Woodson
35. Smith and French	Ottumwa	Coffee
36. Osburn, Owen and Co.	Parallel	Riley
37. Townsin and Campbell	Plymouth	Lyon
38. Bontell, William	Shawnee	Johnson
39. Horner and Co.	Topelka	Shawnee
40. Tracy and Co.	Troy	Doniphan
41. Mills, F.	Twin Springs	Linn
42. Runkle, Peter	Uniontown	Bourbon
43. Barr and Ferguson	Wathena	Doniphan
44. Cox, John	Wathena	Doniphan

county. The five counties reporting the greatest investment in mills were, in order of importance, Marshall with reported capital of \$105,000, Saline \$100,000, Douglas \$79,000, Doniphan \$67,200, and Lyon with \$66,000.

The total value of products for all mills was \$2,938,215. Doniphan county, which led in number of mills reported although only fourth in capital investment, had the greatest value of products, reporting \$459,643. Other counties leading in value of products were Bourbon with \$325,116, Leavenworth \$298,930, Douglas \$172,709, Marshall \$147,342 and Linn with \$105,085.

By 1870 immigration into the state, which received a new impetus after the close of the war, was in full swing and settlement in all parts of the state was rapid. Increased and widespread population created a larger demand for mill products. Consequently an era of small mill building on a much greater scale than at any time previous, began during the early seventies. 46.

As in the case of the first mills to be established in the state, the importance of these mills to the development of the country can hardly be overestimated. They encouraged the settlers to make homes in the territories served by them. They encouraged the growth of wheat, as the farmer who had access to

a mill knew that he could trade ~~off~~ at least a part of his own product for flour and feed "thus making or saving the cost of freight one way on the grain and the other way on the flour." 47

The growth of wheat increased very rapidly during the early seventies. The crop of 1873 was more than 75% greater than that of any previous year, while that of the year following was 100% greater than that of 1873. The crop of 1875 was the first to reach the 10,000,000 bushel mark, yielding 13,209,403 bushels. This rapid growth in wheat production meant increased possibilities in the milling industry and paved the way for the phenomenal development which began later.

In 1874 occurred an event of tremendously far-reaching importance to the future development of the wheat growing and flour milling industries of the state. This was the introduction into Kansas of Turkey hard winter wheat, the excellence of which for flour making purposes has contributed, in a very large measure to the good reputation of Kansas flour.

47. Sixteenth Annual Report of the Bureau of Labor. page 176.

CHAPTER V.

The Introduction of Hard

Winter Wheat

Development of the flour milling industry is dependent upon the possibility of obtaining supplies of grain for the mills. It is not necessary that mills be located in a region which produces wheat, but it must be available, and undoubtedly the phenomenal development which the Kansas milling industry has undergone has been a result, in no small measure, of the great production of wheat in the state.

As noted in a preceding chapter, very little wheat was grown during early years. After 1865, however, wheat production increased rapidly. There was a rapid increase in the population of the state, beginning about 1865. Moreover the increase was largely in the central and western parts of the state which are better adapted to the growth of wheat than to the production of corn. This, the settlers soon learned, resulting in an enormous increase in wheat culture within but a few years.

The soil, climate and rainfall as distributed throughout the growing season all proved very favorable to wheat growth. "Botanically wheat is a grass and requires grass land conditions for proper growth and maturity. It requires a soil sufficiently rich in plant food for proper growth and maturity, but not of such

composition^{aa} to produce an excess of straw at the expense of the grain.⁴⁸ Wheat the world over is extensively grown only in regions of less than thirty and more than nine inches of rainfall with a cool, moist fall and moderately cold winter followed by a moist spring with moderate temperature and a hot, dry harvest season. These conditions obtain in Kansas almost ideally.

In 1865 only 12,768 acres of wheat were harvested yielding 191,519 bushels of wheat, an increase of only 25000 bushels during the five year period preceding, but in 1867 the acreage had increased to 89,285 and the yield totaled 1,250,000 bushels. The rapid increase^{which} began in the two latter years was to continue.

The wheat raised during the early years consisted of both soft spring and soft winter varieties, the varieties then commonly grown in the states from which the settlers had come. Big May, Little May, Fultz, Mediterranean and Canadian Club made up the grists which the pioneer millers ground in the old stone buhrs.⁴⁹

However, the percentage of soft spring wheat grown, declined as the wheat area was pushed westward. The farmers soon found that it was not so successful as soft winter wheat and the latter variety was soon grown almost exclusively. The

48. Scofield, Why Kansas Grows Wheat. page 37.
M. A. thesis, University of Kansas.

49. Kansas Historical Collections. Vol. XII. page 54.

characteristics which made soft spring wheat unsuccessful were its susceptibility to injury from insects and to damage from rust.⁵⁰ Even the soft winter wheat was far from being entirely satisfactory, although it was much more so than the soft spring varieties. It could not stand the rigor of Kansas winters and not infrequently winter-killed, and was also frequently injured by drouth.

It was this fact, that the wheat varieties with which the pioneers were familiar and which they consequently used, were not well adapted to the soil and climatic conditions in Kansas which made the year 1874 an epochal one. In that year Turkey hard winter wheat was introduced into the state, undoubtedly the most important event in the history of wheat growing in Kansas, and consequently of a great deal of importance to the development of the milling industry also.

This wheat was not entirely unknown to Kansas at that time as a French settlement in Marion county had been raising it for some time prior to 1874, although in small quantities.⁵¹ But Mennonite immigrants who came to Kansas in 1874, settling first in Marion county were most instrumental in the introduction and spreading of the growth of the new wheat. This first party of

50. 15th Biennial Report of K. S. B. of A. p. 945.

51. Ibid - page 945.

Mennonite immigrants brought only twenty or thirty bushels of the wheat but in a few years they were producing a surplus above that required for their own seeding purposes and its growth spread to adjoining counties. ⁵² In Dickinson county which in 1876 led in the production of wheat in the state, being the only county to reach the 50,000 acre mark, the wheat was introduced by T. C. Henry in 1877. ⁵³ Mr. Henry who during the two decades from 1870-90 annually harvested thousands of acres of wheat and gained considerable local fame, first attracted attention to Dickinson county in 1874 with a 500 acre field of wheat, the largest in the state.

Adoption of the new wheat was rapidly ~~taking place,~~ although a few years were required to demonstrate its undoubted superiority. Its introduction at a time when the wheat area was being rapidly extended westward, and the greater success which could be obtained with it than could be obtained from the use of other varieties, caused the development of the state as a producer of wheat to be practically the history of the growth of hard winter wheat.

Although it quickly proved its superiority as a producer the new wheat was not favorably received by the millers of

52. Quarterly Report, K. S. B. of A. Sept. 1920, page 219.

53. Kansas Historical Collections. Vol. IX. page 505.

the state. For several years after its introduction it was disparaged by American millers and grain buyers and discriminated against by them in the prices paid for it. The farmers however persisted in growing it and the production rapidly increased, although it received from ten to fifteen cents less per bushel than was paid for the softer and better known varieties. The greater yield per acre more than offset the lower price received for it. The explanation for its unfavorable reception at the hands of the millers will be given in a later chapter.

By 1884 practically all sections of the state had been proved to be well adapted both as to soil and climate to the cultivation of winter wheat, but for a number of years counties in the central section of the state had made a specialty of it before its growth was extensive elsewhere. During a five year period ending in 1884 these same counties had invariably led in winter wheat acreage, average production and aggregate yields. This group of counties was termed the "winter wheat belt" and included Barton, Cowley, Dickinson, Ellsworth, Hays, Lincoln, Marion, McPherson, Osborn, Ottawa, Reno, Rice, Russel, Saline, Sedgwick and Sumner counties, each of which, in 1884 had over 40,000 acres of winter wheat.

The reason for its rapid spread throughout the state was its wonderful adaptability to the conditions of soil and cli-

mate. It was hardy, for it had been grown in a climate of much more rigorous winters than Kansas has and therefore did not have to be acclimated. It was also drouth resistant and was not injured by drouth conditions as was soft winter wheat.

Hard winter wheat possessed other characteristics which were of tremendous importance to the milling industry. Its adaptibility to soil and climatic conditions increased the amount grown very much and removed the uncertainty as to yield which had hither-to attended the growth of wheat. The other characteristics were those which made its quality greatly superior to other varieties for milling purposes. Experts have said that the quality of Kansas wheat has been more influential in the development of the milling industry in the state than the large quantity. ⁵⁴

Briefly, good milling wheat is that which will produce the greatest amount of flour of the best quality.

It is usually estimated that 270 lbs or $4\frac{1}{2}$ bushels of wheat testing about 58 lbs. to the bushel are required to produce 196 lbs or one barrel of flour, which is referred to by millers as a 4-30 (4 bushels and 30 lbs.) yield. If the wheat is heavier in test, or if the bran is thinner and separates readily from the endosperm, a little less wheat is required per barrel of flour and the yield may drop to 4-27 or 4-25. When the yield drops it means

54. "The milling industry of Kansas has developed primarily because of the quality of Kansas wheat rather than because of the large quantity." Prof. F. A. Fitz - Kansas State Agriculture College in Kansas Historical Collections. Vol. XII. page 58.

that less wheat is required per barrel of flour; the flour yield per bushel is actually more. On the other hand if the wheat is lighter in weight or the bran is thicker the yield runs up to 4-35 or 4-40 and perhaps as high as five bushels per barrel.

While the variation per bushel may be slight, the matter of yield is a very important one to the miller. If he is operating a 500 barrel mill and the wheat he uses is of such quality that it requires 4 bushels and 32 lbs. for each barrel of flour it will mean that at the end of each days operations he will have 1000 lbs. less flour than if the wheat had a 4-50, rather than a 4-32 yield. Kansas hard winter wheat mills well, the flour making portion usually separating readily from the bran coat and germ, and the per cent of flour obtained normally runs higher in the hard winter wheat than in the soft winter varieties.

But the popularity of Kansas hard winter wheat for milling purposes is due almost wholly to the character and quality of the gluten it contains. "There is a subtle something stored within the cells of the wheat kernel and by reason of the presence of this characteristic substance the flour is able to absorb and hold a relatively large amount of moisture and to produce a large light loaf of even thin-walled texture and delicious flavor. We usually refer to this substance as gluten but that does not tell the whole story because a wheat and a flour may have a sufficient quantity of gluten and yet not produce a satisfactory loaf of

bread."

"Baking tests have repeatedly proved the good quality of gluten in Kansas hard winter wheat. Protein determinations are not of particular value, for although it is a good indication of the probable amount of gluten present it does not give any indication of the quality, which in Kansas wheat is possibly of greater importance than its quantity. The average per cent of dry gluten contained in ordinary bread wheats is about 10%, but many of the hard Russian varieties contain over 14%." ⁵⁵

It should be noted that while this wheat is quite widely distributed over the state it proved itself to be much better adapted to the central part of the state where it was first introduced, and to the western counties rather than the east or south-eastern parts of the state. Consequently its growth on a large scale is confined to that area. Wheat is not grown extensively in the eastern counties and it is impossible to grow a good quality of hard wheat in south-eastern Kansas even though new seed is sown every year. Difference in climatic conditions account for this. ⁵⁶

A fact which is undoubtedly of considerable importance to the flour milling industry of the state is that Kansas is the only state in the Union to produce Turkey hard winter wheat in

55. Prof. L. A. Fitz - Quarterly Report of K. S. B. of A. September 1920. page 200.

56. L. E. Call in Quarterly Report of K. S. B. of A. Sept. 1920, page 184.

considerable quantities. The hard winter wheat belt runs into Nebraska a short distance and this wheat is also grown in northern Oklahoma, in addition to which there are two or three localities elsewhere in the country where it is produced in small amounts. With these exceptions, however, hard winter wheat is not grown successfully outside of this state, and Kansas has a virtual monopoly in its production.

The first report on the Kansas milling industry was made, in 1874, by the State Board of Agriculture.⁵⁷ At that time 166 mills were reported in the state. Of this number, 139 were listed as flour mills and 27 were classified as grist and saw mills. Unfortunately aside from the enumeration of mills and the amount of capital investment, this first report contained no information of importance relative to the industry.

The capital investment shows a substantial increase over the figures for former years. It will be recalled that in 1860 the capital investment in the industry was only \$107,730. Ten years later, it had increased to \$1,056,800 and in 1874, as a result of the rapid increase in milling facilities, the capital investment had climbed to \$2,241,497, an increase of more than 100% during the 4 year period ending in 1874.

However the most phenomenal increase in the number of mill-

57. "The earliest compiled report of the milling industry in Kansas was made in the Agricultural Report of 1874" - 1st Annual Report, Bureau of Labor and Industry (1885) page 195. Prior to this time the only sources of information on the milling industry were the census reports.

ing establishments of any ten year period in its history, took place between 1870 and 1880. At the beginning of the period, as noted before, there were only 106 mills reported in the state; ten years later, as a result of the impetus given to the establishment of mills by the rapid increase in population and in the growth of wheat, the number had increased to 320, an increase of practically 300%. There was a corresponding increase in capital investment, from \$1,056,800 to \$3,935,828 or nearly 400%. Value of products, which in 1870 was \$2,938,915 increased to \$11,858,022 or approximately 400% also.

As a result of the great increase in the settled area of the state, the distribution of these mills was much wider than it had been in 1870. In 1860 only 14 counties reported milling establishments. In 1870 the number of counties reporting mills had increased to 29; in 1880, 48 counties reported from 2 to 12 mills each. ⁵⁸

Not only was there a marked increase in the number of establishments, capital investment and value of products but there was also a noticeable increase in the size and output of individual

58. The number of counties possessing mills of some description or other was probably greater than this, as all counties having a gross product of less than \$100,000 annually, and all industries producing a value of less than \$20,000 were omitted in the Census Report.

The ten counties leading in value of products were, in the order named, Leavenworth - \$1,210,503; Shawnee - \$762,010; Bourbon - \$538,746; Labette - \$411,800; Marshall - \$374,456; Saline - \$335,216; Douglas - \$329,877; Harvey - \$295,758.

establishments. In 1860 capital investment per mill was slightly less than \$3000. In 1870 this figure had increased to approximately \$10,000 and in 1880 the average capital investment was \$12,500. The annual value of products per establishment was, in 1860, somewhat more than \$8000; in 1870 it was more than \$27,000, and ten years later amounted to \$37,000 annually.

The increase in value of products was much more noticeable in the ten counties which in 1880 led in this respect. Leavenworth, which in that year led in production, had seven mills, the average production of which was valued at \$172,929 while the average per mill for all mills in the ten counties was nearly \$75,000. The average for the ten counties leading in value of products in 1870 was but \$53,000 while in 1860 it was but slightly more than \$15,000 per mill.

Undoubtedly, mills during these early days were sources of considerable profit to their owners, or could ordinarily be made so. Mills would not have increased so rapidly if this had not been true. It is very difficult, however, to compare the profits made by these pioneer establishments with the profits made by present day millers, because of the lack of information concerning the operations of early mills. It is equally difficult to attempt to estimate the per cent of profit made in the early mills.

During these years the majority of mills were "exchange" mills. Instead of waiting until the grain which he brought to the mill was ground, the farmer received an amount of flour or meal equal to that which his own grain would produce, less the toll which

was charged for grinding the grain. The amount which he received varied, the farmer usually, however, getting for each bushel of wheat from 25 to 35 pounds of flour while the miller retained the lower grades and the by-products.

These by-products, which the miller retained, were a source of considerable profit to many millers and it is not improbable that this was the secret to the prosperity of many farsighted pioneer millers. In a good many cases no use was made of the bran, but a very large number of millers kept herds of cattle, feeding them upon this material.⁵⁹ This is a phase of the operation of the early mills which is rather difficult to obtain information of, more than likely because of the fact that the pioneer miller usually was a farmer and stock raiser as well, and the profits from his stock-feeding operations, although actually coming from his milling activities, was not attributed to his mill profits.

Another feature of the operation of these early mills, which at least increased the opportunity for profits was the lack of systematic methods. No books were kept, as a rule, and careless methods of handling the grain and flour prevailed. The farmer took his grain to the mill and the miller exercised his own discretion in giving him flour or meal in return. These conditions, combined with the fact that the early mills partook of the nature of local monopolies, were such in fact, in a majority of cases, gave the pioneer

59. Interview C. V. Topping, Secretary, Southwestern Millers' League.

millers who "waxed fat by tolling the grist which came to his mill" opportunities for profit which he undoubtedly did not overlook.

Another consideration which was doubtless responsible, in a considerable measure, for the rapid multiplication of small mills during the two decades from 1870-90 particularly, was the relatively small investment required. It was pointed out above that the investment per mill was increasing but at the same time it was shown that this tendency was most marked in certain counties which led in flour production. There is no way of determining what the investment in the small rural mill was, but it was doubtless much smaller than the average for all mills. The possible profits were large, operation of the mill did not, at least in many cases, prevent the operation of a farm also, and the original cost of a mill was not prohibitive.

Many of the smaller mills still did mainly custom work, in fact such mills could be found until a comparatively recent date. Concerning the tolls charged in his mill, which seem to have been quite customary an early miller wrote:

"Rye, wheat and corn are ground into flour 1-6, and chop 1-8. Seldom do a cash business, principally toll; cash 5¢ per bushel for chop; 10¢ for flour." 60

It may be noted here that modern millers are satisfied to receive from 10 to 15 cents per barrel for flour above its actual cost of production. At the rate quoted above, the miller received from

60. Eleventh Annual Report Bureau of Labor and Industry. page 117.

45 to 50 cents per barrel for his services. Undoubtedly the modern milling process is much more efficient than the old buhr mills but notwithstanding that, ^{fact} it is probable that the profits of the old time miller were much greater for the capital and labor involved than that of present day milling establishments.

The profits of the pioneer miller who did not do a cash business were dependent then, as now, on the price of wheat. If wheat was a good price the toll would be profitable; if the price of wheat was low in price his profits were less.

The following statement made by the owner of a well known milling establishment in Topeka, concerning the milling situation in 1871, is suggestive of the profits that were made:

"Bank accomodations were secured at the rate of $1\frac{1}{8}\%$ per month, in advance. But neither bankers nor millers were in Kansas for their health in those days, nor doing business for glory; so that the comfortable margin of profits on our sales enabled us to even up with the bank." 61

According to an article appearing in the Kansas Magazine ⁱⁿ for 1878 62 every well conducted mill in the state made large profits,

61. 16th Annual Report Bureau of Labor and Industry. page 185.

62. "Probably there is not a mill in the state that has a capacity that would average 150 barrels a day and there is not enough to manufacture 1% of the present crop. Every well conducted mill is paying large profits and I doubt if there is any other business in the state that pays so well."

Kansas Magazine, 1878, Volume I, No. 1.

larger than those of any other industry. Of interest is the statement that there was probably not a mill in the state of 150 barrels capacity. While this is very probably an exaggeration, it is suggestive of the small capacity of most mills, a condition which actually existed.

During the decade 1870-1880 Kansas flour first began to be known outside of the state. It was not until about 1870 that the production of flour became great enough to meet the requirements of the people of the state.⁶³ From that time on, however, there was a tremendous increase in wheat production, as noted previously, and a corresponding increase in the number of mills resulted for the first time in the production of a surplus of flour.

The first shipment of Kansas flour was made, however, a number of years before this. In the year 1856, only two years after the territory was opened to white settlement, the firm of Mahon and Kimber of Palermo shipped one hundred sacks of flour to their agent in St. Joseph, by way of the Missouri river.⁶⁴

An establishment which was one of the first, if not the earliest, to ship flour outside the state, was the pioneer firm of

63. Kansas Historical Collections. Vol. IX. page 117.

64. "The old town of Palermo in Doniphan county had the distinction of having made the first shipment of flour out of Kansas territory. The shipment was made in September, 1856 on the steamer Minnehaha and consisted of 100 sacks. It was manufactured at the mill of Mahon and Kimber from wheat raised in Kansas territory. It was consigned to Mahon and Kimber's agent, Culver Hyatt, at St. Joe. Regular consignments were made by this firm to Hyatt thereafter."

Kansas Historical Library - Everest Enterprise (no date) clipping.

C. Hoffman and Sons of Enterprise. This firm shipped three car-loads of flour, consigned to a broker in Sherman, Texas, in 1873. ⁶⁵

Prior to that time this mill had been run on grist or toll trade, the average toll being $1/6$ of the wheat brought in or 25¢ per bushel for grinding, the farmer usually receiving about 32 pounds of flour per bushel of wheat.

The shipment of flour by the larger mills to points both within and without the state was made possible by railroad development. During the earlier days the shipping trade was wholly within the state. A Topeka miller in reviewing the development of flour shipment wrote the following: "Our first car-load shipment was to Florence, when the Santa Fe was first opened to traffic to that point; a little later to Newton, Wichita, Hutchinson, Sterling, and other western towns as they sprang into existence following the progress of the Santa Fe as its construction army nightly pitched its moving tents a day's work nearer the western border. Then beyond into Colorado and down to the old city that gave its name to the railroad."⁶⁶

The shipment of flour from Kansas to neighboring states began about 1878 from some older and larger mills.⁶⁷ There are no data available concerning the amount of flour shipped out of the state,

65. Kansas Historical Collection. Vol. XII. page 58.

66. 16th Annual Report, Bureau of Labor and Industry. page 178.

67. Kansas Historical Collections, Vol. IX. page 152.

annually, during these years. There was some shipment of flour, during earlier years to the west, but the greatest market for Kansas flour was then, as now, in the states farther east.

CHAPTER VI.

Development in Milling Processes.

Next to the introduction of hard winter wheat, in importance to the development of the Kansas milling industry, were the improvements made, during the last quarter of the 19th century, in milling processes. The reputation which the state has as the largest producer of the best wheat grown in commercial quantities anywhere in the country has been largely a result of the adoption of hard winter wheat. But the improvements which within but a few years practically revolutionised the milling process, were also of great importance to the industry. In fact, it was this development which made possible the success which the millers of the state have had in producing a flour of high quality from hard winter wheat. For this reason the story of Kansas milling development would be incomplete without an account of the development in milling processes in relation to the growth of the milling industry of the state.

In the old historic mills of the Brandywine, referred to in Chapter I, the milling process was exceedingly simple. The wheat, cleaned by a rude machine consisting of two wire cylinders or screens and an air blast passed through a pair of mill stones running very "low" or close together in order that the greatest amount of flour might be produced at one grinding. The meal or resultant product was then "bolted" or sifted, the super-fine flour thus separated and the "tailings", consisting of bran, middlings (coarse unground material) and adherent flour, again separated by sifting through bolting reels, and reground. This second product varied much among millers, some producing a fine, others a dark impure flour containing a high percentage of bran. It seems probable that the millers of

the time had some notion of the high grade of flour which could be ground from middlings but this was not done at that time.

The first material improvements in the milling process were made during the latter half of the eighteenth century by a Philadelphia miller, Oliver Evans. The devices developed by him, the most important of which were the elevator, the conveyor, the drill and the hopper bogy introduced the automatic handling of the raw material and the product in the various stages of its manufacture.⁶⁸ These were used in practically the same form in which he developed them until the introduction of the roller process of milling.

The benefits resulting from the improvements made by Evans were a general speeding up the milling process, lessened cost of operation because fewer men were required to operate the mill, less waste and economy in space in the mill. There were improvements in the bolting process also, the principal ones being the use of finer cloths which increased the fineness of the flour, and lengthening the bolting reels to produce a more complete separation of flour and bran than was formerly made.

This, in brief, was the development which had taken place in the flour milling process at the time the industry was just obtaining a foothold in the state. To distinguish the method then used from methods developed later, this method is usually referred to as the "old" or low grinding process.

The old process of flour milling consisted essentially of two parts which were first, the reduction of wheat by passing it through a set of burr stones, and secondly, the bolting of the resultant material, separation of the flour and bran. The principle object of the miller when

68. Tenth Census of U. S. vol. III, page 561.

running by this process was to produce the greatest amount of fine flour in passing the grain but once over the millstones. To do this necessitated operating the stones very closely together hence the term "low grinding."

The mill stone was the principal machine of the mill and the success of the mill's operation, both as to the quantity and quality of the flour produced depended upon, the "dress" of the stone, the "face" or grinding surface, the balancing of the upper, or runner stone and finally the speed of the stones.

By dress was meant the shape, width, depth and variation from the radius of the furrows which, extending from the center to the edges of the stone, aided in the grinding operation and facilitated the ejection of the meal. These furrows were deeper near the center of the stone, dwindling to almost a flat surface near the edge. The distance between the upper and lower stones was, of course, less than the diameter of the wheat berry. As the upper stone revolved, the furrows acted like shears in cutting the berries into fragments, the success with which they did this depending upon the dress. The old time miller was constantly alert to maintain the proper width, depth and shape of the furrows. This was accomplished by picking the stones with iron chisels.

The land was the surface of the stones between the furrows which crushed the fragments into which the berry was cut by the edges of the furrows. This surface was slightly roughened which permitted the meal to pass gradually out between the stones.

It was a matter of prime importance also for both mill stones to have a perfectly plane surface in order that the product would be uniform in fineness. For the same reason it was important that the stones be balanced exactly, in order that the upper stone would run horizontally.

Otherwise the meal would not be distributed evenly between the stones and the efficiency of their operation would be impaired.

The speed of the stones varied somewhat with the grain to be ground and the dress of the stones. However, where the object was to produce, as was the case in the low grinding process, as much flour as possible at one grinding, it averaged about 250 revolutions per minute.

The second and last part in the old low grinding process of making flour was the bolting or separation of the flour from the bran or coarse material. The machine, called a bolt, by which this was effected consisted of a cylindrical frame of wood some eighteen feet long, ordinarily, and about 30 inches in diameter, covered with specially prepared bolting cloth tacked to the longitudinal pieces of the frame. This cloth was of varying degrees of fineness depending on the nature of the material to be bolted. In later years the use of silk bolting cloth was developed, but this came after the pioneer days of Kansas milling were past. Generally four bolts were inclosed in a frame, two of which were used for bolting and two, called return bolts, were used for re-bolting. The whole arrangement was called a "Chest" which was so constructed that it could be turned with a crank. The bolting process in the early mills was accomplished entirely by hand.

The chest was placed in such a position that it inclined considerably from the horizontal. The material which was to be bolted was placed in the raised end of the bolt and as the chest was revolved by turning the crank, the meal gradually worked down to the other end of the bolt the flour being sifted through the bolting cloth while the coarser material and bran remained.

The old, or low grinding process of flour milling described above was almost universally used until about the year 1870. Hence, all the pioneer Kansas milling establishments were of this type. They were usually of the simplest construction embodying the essential features of the low grinding process as it was used elsewhere but having fewer of the devices for improving efficiency such as were developed from time to time, than the mills of older communities. These old burr mills consisted usually of one or two sets or "runs" of stone burrs and a hexagon reel.⁶⁹

The clearest picture of the type of milling establishment which was to be found in the state during early years can be obtained from descriptions which are available of a few early establishments. The Shawnee mill of Topeka, built in 1869 was typical of the better and more important mills, and in 1871 equal in point of equipment and process used to any in the state.⁷⁰ The milling equipment of this establishment consisted of two "runs" or sets of four foot burrs used for wheat and middlings and one "run" used on corn and other grains. This establishment milled all kinds of flour as well as feed; wheat, corn, rye, oats, and buckwheat were all ground. In the flouring process the aim was to reduce the wheat to flour as nearly as possible at one grinding. The flour from the first operation, after being submitted to the action of the long hexagonal reels with which the mill was equipped, was the best that was made. "Any difference in quality of the flour was due primarily to the quality of the wheat and after that, in no small degree to the perfect dress of the mill-stone and the exactness of its running, as well as standing,

69. Kansas Historical Collections, vol. XII, page 53.

70. Kansas Historical Collections, vol. XI, page 152.

balance.⁷¹ The secret of good milling was in the painstaking care and intelligence of the miller. Consequently there was a much greater range in the quality of flour at that time than there is today, when the use of rolls to a considerable extent standardizes the flour product.

As the coarse unground portion or middlings, unavoidably produced in the grinding operation, and remaining after the flour was separated by bolting, accumulated, it was reground in the branny or unpurified state to produce second grade and low grade flour. This completed the flouring process used in the Shawnee mill, which was typical of that used in such establishments all over the state.

Probably the first improvement in milling methods used in pioneer establishments was, as in the case of the Shawnee mill, the introduction of bolts to be used on corn meal which before this time was neither bolted nor sifted.

Millers of the day were not as much concerned about the quality of their product as they later became when competition developed and the loose and wasteful methods which formerly characterized the industry, were things of the past. As already noted, equipment was practically the same everywhere and, except in a few of the larger towns, the mills were in the nature of local monopolies whose operators could run them much as they pleased. There was little of the spirit of improvement which later became very evident. A farmer proprietor of the Shawnee mill termed the corn meal bolt installed in that establishment a useless expense.⁷² This was typical

71. Sixteenth Biennial Report, Bureau of Labor, page 177.

72. When a former proprietor called soon after (installation of the corn meal bolt) and observed the chest full of bolted meal he asked, "what are you doing that for? And when the reply was made, "To improve the quality of the meal," he pronounced it a useless expense. "No other mill bolts its meal and you don't need to so long as no one else does."

of the attitude which prevailed among millers of the time.

The first real improvement in the flour milling process was developed in the Northwest. At that time hard spring wheat was the only kind successfully grown there, and it could not be milled satisfactorily by the use of the old low, grinding process.⁷³ This wheat, when ground between stones running close together, produced a dark unsatisfactory flour and when reduced to a degree of fineness which permitted it to pass through the bolting cloths the flour was specky.⁷⁴ Consequently it became evident that in order to produce a first class flour some new method must be employed, and Edmund N. La Croix experimenting in the mill of George H. Christian in Minneapolis invented, in 1870, a "middlings purifier", or machine for separating the dust, fluffy particles of bran, flour, etc. from the middlings.⁷⁵ A great deal of experimentation along this line had already been made in Europe, and a machine resembling the La Croix purifier had been patented in France in 1860. However, it was to La Croix that the middlings purifier owed its introduction, and its first practical application to milling.

The idea of the purifier was realized in a number of different machines but the type probably most widely used consisted of a series of sieves in connection with an air-blast, the sieves being agitated to separate the middlings and heavier impurities and the air blast removing the lighter impurities.

The invention of the purifier was of great importance to the milling industry. Its use enabled millers to obtain a greater quantity of flour of

73. Bellows- A Short History of Flour Milling- page 3.

74. Tenth Census, Manufactures, page 564.

75. Tenth Census, Manufactures, page 565.

better quality than could previously be obtained. It is probably true also that it paved the way for the development of later improvements which were of even greater importance to the industry.

Although the invention of the purifier came as a direct result of the impossibility of producing flour of a satisfactory quality by the use of the low grinding process, its use proved to be beneficial in mills using softer varieties of wheat also, and was rapidly adopted elsewhere. It will be recalled that Turkey hard winter wheat was not introduced into Kansas until 1874, and prior to that time soft wheat was grown much more extensively than it was later. The first mill in Kansas to install one of the new purifiers was the pioneer establishment of C. Hoffman and Sons, of Enterprise, in which one was placed in 1873, only three years after the invention of the purifier in Minneapolis.⁷⁶ The Shawnee mill of Topeka installed their first purifiers in 1873, also. Concerning the adoption of purifiers as a part of their equipment by the other mills in the state, little is known, but their use proved beneficial and they were doubtless generally adopted by all the larger plants, at least, after 1873.

This was the stage in the development of the milling process which had been reached when the new hard winter wheat was introduced into the state.

It will be recalled that although the success of the new wheat as a producer was almost immediate, the reception which it received at the hands of the millers was unfavorable. A substantial reduction over the

76. Sixteenth Annual Report; Bureau of Labor, page 181.

price paid for other wheat was made in the price paid for the hard winter wheat. The reason for this was the fact that its flinty character made it very difficult to mill by the old low grinding process then in use, the flour produced being of distinctly inferior quality.⁷⁷

But the growth of the new hard wheat continued to increase and promised to be eventually the variety chiefly grown. Consequently it became highly necessary that some method of milling be developed which would moressuccessfully mill the hard winter wheat. In this extremity the next step in the development of the milling process was the substitution for the old method of low grinding, of the new process of flour milling. This was simply the gradual reduction method of milling which had been long known in France, Switzerland, Austria and Hungary.⁷⁸

The essential feature of the new process was the reversal of the system of low grinding and the substitution of "high grinding". But instead of actually grinding the wheat as in the^{old} process, it was granulated, that is, the flour making portion of the berry was not reduced to flour in its first passage between the mill-stones but was simply crushed and liberated from its covering of bran. Instead, as in the low grinding process, of producing the greatest amount of flour possible at the first grinding, it was the aim of the miller to produce as small an amount of flour at the first reduction as possible. The mill-stone was accordingly raised so that instead of grinding the wheat it was merely cut into

77. "When the hard wheat was first grown in McPherson County most of the millers rejected it for milling purposes, and even the farmers who raised it did not want the flour made from it." -- Herbert Hackney in 13th Bi. Report K.S.B. of A., page 533.

78. Bellows- A Short History of Flour Milling, page 38.

fragments, hence the term "high grinding."

Changes were also made in the face or grinding surface of the mill stone with the object of lessening the grinding action and increasing the production of fragments of the endosperm or flour making portion, called middlings. The speed of the mill stone was decreased from 200 or 300 revolutions per minute in the old process to an average of about 140 revolutions or even less. The lessened speed decreased the power required to operate the mill stones. The size of the stones was also decreased from six feet to four or four and one half feet in width the object being to allow the material to escape as soon as granulated and reduced the production of flour at the first passage through the stones to a minimum.

Stones of these dimensions running at a speed of 140 revolutions per minute granulated about 5 or 6 bushels per hour. This was considerably less than was produced by the old process, but was compensated for by the superiority of the product over that produced by the old process.

The new process of milling consisted of four operations, purifying and regrinding the middlings being added to the grinding and bolting as in the old process. After the granulation of the grain between the mill stones the resultant product or chop was separated into flour middlings and bran by means of bolts, technically called "scalping reels". The flour produced at this reduction was of inferior quality but only a relatively small amount was produced, the aim being, as noted above, to produce as little as possible.

The middlings or coarse unground flour making portions of the berry produced the strongest and best flour. The quantity of middlings produced varied greatly with the quality of the wheat and condition of the

mill stones. To produce one barrel of the best flour, $4\frac{1}{2}$ to 8 bushels of wheat were used.

After being dusted in dusting reels the middlings were run through the purifiers which removed all coarse materials, only the flour making portions remaining. Following this operation the middlings were re-ground either on separate stones or mixed with wheat, the former being the better and more widely used method.

The new process was first introduced into the George H. Christian mill at Minneapolis, at the time the middlings purifier was developed and was also the invention of Edmund H. La Croix. The middlings purifier became, in reality, an essential part of the new process, although it was successfully used and widely adopted in mills using the old process, before the use of the new process became general throughout the country.

The quality of flour which could be milled from the hard spring wheat of the Northwest was found to be greatly improved by its use and adoption of the new process by the mills of this territory was rapid. Formerly Northwest flour which was not consumed locally, was shipped down the Mississippi to St. Louis to lose its identity in blends with the soft wheat flour of Missouri and Illinois. From this time on, however, it increased in favor and soon became very much in demand.

79

79. The product of the Minneapolis mills suddenly was as much in demand as that of the mills of Hungary in Europe and there was an extraordinary increase in mill-building not only in Minneapolis itself, but at other points in the spring wheat territory.- Bellows, A Short History of Flour Milling. page 57.

The new process was gradually substituted for the old in many soft territories as well, particularly by the larger mills. ⁸⁰

But in Kansas, before hard winter wheat became the variety chiefly grown, the older method continued to be used. It was possible, especially after the development of the middlings purifier, to produce a satisfactory quality of flour from the soft wheat then grown with the old process of low grinding. The old process was as economically applicable in the small frontier establishments, such as many Kansas mills were, as the new. ⁸¹ Consequently the new process was not adopted by Kansas mills for several years after its use in other sections of the country, particularly the Northwest, had become general.

However, as noted above, the rapidly increasing growth of hard wheat following soon led to its adoption in this state, also. Just when the first mills in Kansas were equipped for it cannot be learned, but in 1878 it was just coming into favor among the millers of the state. ⁸² The Shawnee mill, was overhauled and the old process

80. "The new process, found highly successful on hard spring wheat, was tried on wheat of a softer nature and found to operate satisfactorily, enabling the millers not only to produce their flour more economically but to name it patent for which there has been and yet continues to be, a preference in the market." Tenth Census, Manufactures. page 578.

81. "It is the opinion of those who have watched the various milling systems in Europe that high grinding is adapted chiefly to hard wheats; medium high, or low process to wheat of a greater tenacity of bran and starchiness of endosperm, while the old or low process is economically applicable only to very soft winter wheats and for small country and frontier mills." Tenth Census, Manufactures. page 579.

82. J. L. Shellabarger in 16th Annual Report of Bureau of Labor and Industry. page 178.

replaced by the new in 1878, with the necessary full line of purifiers required to handle the increased quantity of middlings obtained by its use. During the latter years of the decade, 1870-80 the growth of hard wheat increased greatly and during these years and the early years of the decade following many mills were thus equipped.

The adoption of the new process by the mills of the state was a notable advance and a development of some importance to the industry. However a still more important development was to follow. This was the roller process of milling.

Rollers were first used in the milling^{of} flour, in Switzerland about the year 1820.⁸³ In this country, the roller process, as in the case of the middlings purifier and the new process, was first developed in the Northwest. In 1874, George H. Christian ordered a set of rolls for experimental purposes. Four years later, Governor Washburn, a prominent miller of Minneapolis, who had seen roller mills in operation abroad, built a 100 barrel experimental mill. There was little faith in it, however, and when in 1878 one of the units of the Washburn plant was burned it was rebuilt with burrs as equipment. But two years later it was decided to rebuild the mill using rolls as equipment. In 1880 the mills of C. A. Pillsbury and Company were roller equipped.

As suggested above, the most essential feature of the roller system is the substitution, for the time-honored burrs, of smooth iron or porcelain rollers. The wheat is reduced to flour, not at one opera-

83. Tenth Census of United States. page 573.

tion as in the old low grinding process, nor in two or three as in the new process but by several successive passages through the rolls. The wheat is first passed through a pair of rollers which split the berries open along the crease, liberating the dust so that it can be removed by bolting. A very small percentage of low grade flour is produced at this reduction. After the material has been bolted it is passed through a second set of rollers where it is further broken; each passage through the rolls is called a "break". After each "break" the material is bolted. These operations are repeated until the flour portion is entirely separated from the bran. The middlings, after passing through purifiers are reduced to flour in successive passages through the rolls. The different regrindings are separated and bolted until the various grades of flour, about 5 or 6 in number, are produced. ⁸⁴

Roller equipment was introduced into some of the more progressive Kansas mills about 1881 or 1882, only a year or two after its first successful demonstration in this country. Once started, adoption of roller equipment by the larger mills of the state was very rapid. The Perry Hutchinson mill, one of the pioneer establishments of the state, was among the earlier mills to install roller equipment and perhaps was the first to do so. In 1881 or 1882 this mill was remodeled into a fine roller mill, one of the first full roller mills west of the Missouri river. ⁸⁵

84. Ibid. page 573.

85. Kansas Historical Collections. Vol. XII. page 57.

Another early mill which substituted rolls for the old stone burrs was the Hoffman mill at Enterprise. In 1881, Hoffman built a new mill and two rolls were installed as a part of its equipment, one of which was used for corn and one on germ middlings. In this mill the first break was made on burrs, which was not an unusual arrangement during the early days of the roller process. In 1883, the four stone burrs used in breaking the wheat were replaced by rolls. The arrangement of machinery in this mill was different from that found in modern mills. Instead of all the rolls being on one floor, the sifters on another and the purifiers on still another, which is the usual arrangement in modern milling establishments, the rolls were arranged on floor one above the other, and under each roll was a shaker, screen which separated the middlings from the remainder of the stock.

The mill which was later operated by the Topeka Milling Co., was equipped with rolls when it was built in 1882.⁸⁶ Roller equipment replaced the old burrstones in the Shawnee mill the year following.⁸⁷

The use of roller equipment not only improved the quality of flour, but also increased the quantity which could be milled from a bushel of wheat. However the new process produced a flour of good quality, and the chief reason for the superiority of roller equipment

86. Kansas Historical Collections. Vol. XII. page 58.

87. 13th Biennial Report K. S. B. of A. page 535.

was the increased production of high grade flour possible with its use.⁸⁸ This fact soon led to the replacement of burrs by rolls in all the larger mills of the state.⁸⁹ Practically all the new flour mills built anywhere in the United States, after 1880, were equipped exclusively with rolls.⁹⁰

There are no statistics available on the relative numbers of burrs and of rolls for the years prior to 1885. In that year, however, the equipment of Kansas mills consisted of 41% burrs and 59% rolls. Four years later rolls had practically displaced burrs.⁹¹

88. 16th Annual Report Bureau of Labor and Industry. page 178.

89. "The use of the rolls resulted in an increased production of high grade flour from a bushel of wheat and this soon forced all the Kansas millers to install rolls. Kansas Historical Collections Vol. XII, p. 58.

90. Bellows - A Short History of Flour Milling, page 58.

91. Numbers and Relative Percentages of Burrs and Rolls in Kansas Mills, 1885-1889.

Year	Mills Reporting	Number of Burrs	Mills Reporting	Sets of Rolls	Percent of Burrs	Percent of Rolls
1885	139	416	79	604	40.78	59.22
1886	163	420	103	908	31.62	68.38
1887	150	379	130	1244	23.35	76.65
1888	132	303	129	1373	18.08	81.92
1889	126	261	133	1381	15.9	84.1

In an earlier chapter a brief account of the beginning of the flour trade in Kansas was given. Following the construction of the first railroads in the state, the shipment of flour was begun in the early years of the decade 1870-80, at first for short distances only but, as rail lines were extended over the state, increasing in importance.

However, there were difficulties in the path of this development. In the undeveloped condition of the milling industry in early days, Kansas flour had little or no reputation. The home product was discriminated against by buyers and trade in Kansas flour was, in most communities, at a low ebb. The situation, more or less general over the state, is illustrated by conditions in Topeka during the early years of the decade 1870-80. Flour shipped in from other states, principally from Missouri had practically full control of the city market. A large proportion of the "best" families would not accept any other than a Missouri brand, and the name Kansas on a sack of flour was enough to condemn it untried. ⁹²

Although the millers of the state insisted that Kansas flour was of as good quality as that produced elsewhere, ⁹³ it is probable that it was inferior in some measure to that produced in other states. Kansas milling establishments were not as well equipped to produce flour

92. 16th Annual Report, Bureau of Labor and Industry. page 178.

93. 16th Annual Report, Bureau of Labor and Industry. page 178.

of the best quality, as mills in the older states. Undoubtedly the product of Kansas mills was of less uniform quality than that produced elsewhere.

In the face of this situation, which was a serious one for the milling interests of the state, Kansas millers more or less generally resorted to the expedient of marketing their product under a Missouri label. The fact that under the guise of foreign brands, Kansas flour was accepted without question suggests that this prejudice was partly unfounded and a result of the undeveloped condition of the industry. During succeeding years flour produced from the soft wheat grown in the state gradually grew in favor.

But, when in the late years of the decade 1870-80 and the early years of the decade following, millers first began to grind the new, hard winter wheat they had great difficulty in marketing it. Because of its flinty character the flour produced from it, by the use of the old process was of decidedly inferior quality. This is the explanation for the unfavorable reception which the new hard wheat received at the hands of the millers, who attempted to grind it. The flour was so inferior to that which could be produced from softer varieties of wheat that it attained a negative reputation for quality almost immediately. Even after the adoption of the new process, which produced a very good quality of flour from hard winter wheat, it did

not come into favor rapidly. The situation was a very difficult one for the millers of the state.

Although hard winter, when milled by the new process, produced a flour which was undoubtedly superior in quality to that milled from soft wheat, there was general dissatisfaction with hard winter wheat flour. It required different handling for results equally as satisfactory as could be obtained from the use of the soft wheat, and consumers did not readily recognize the merits of the flour. 95

95. "The pathway of millers who first ground the Kansas hard wheat into flour was not carpeted with roses as thorns predominated. Their patrons had been accustomed to the flour from the soft wheat and no one who has not been a miller can appreciate the difficulty to be overcome when he tries to convince women against their will that anything new or different is as good as the old product with which they have been familiar. The miller does not deal directly with the ladies who bake bread for domestic use, but through his customer, the grocer, he hears directly if for any reason the flour he mills is imperfect or in any way different from the flour to which the aforesaid ladies have been accustomed even though his improved machinery and milling methods enable him to deliver a flour better in every way. If it works differently, requires more kneading, or even if when baked it turns out a sweeter if less chalk-white loaf of bread and one which will retain its freshness longer, the good ladies are unconvinced. This prejudice nearly ruined the millers who first blazed the way for hard wheat flour in sections where the people had been brought up on soft wheat bread."

Herbert Hackney - 15th Biennial Report K. S. B. of A. page 552-3.

Bread baked from it was of a somewhat different texture and had less of the fine white quality which characterized the products of soft wheat flour, and although of greater nutritive value and retaining its freshness longer, the reception early given it was far from favorable. This prejudice nearly ruined many millers who blazed the way for hard wheat flour in sections where the people were accustomed to bread made from soft wheat flour.

An experience of a Topeka milling firm was typical of the difficulties encountered by millers of the state when they first milled and attempted to market hard wheat flour. When this mill, which was roller equipped, was built it was decided to grind hard winter wheat. As a result, several cars of flour milled by it and consigned to various points in Kansas, Missouri and Iowa were condemned and payment for the flour was refused by the consignees, because the flour was different from that to which the flour trade was accustomed. Fortunately for this particular firm, wheat advanced very much just at that time and the grocers were induced to retain it and gradually dispose of the flour.

Because of the little favor in which it was held it was a common practice to mix hard wheat flour with flour made from soft wheat. In this way it was possible to dispose of it. As a rule millers began the use of hard wheat by mixing a small percentage of it with softer varieties. The gradual change from soft wheat to the new hard wheat, made it possible to increase the percentage of hard wheat gradually, the public thus becoming educated to its use. But woe

befell the miller who became impatient and increased the percentage of hard wheat flour too fast.⁹⁶ Consequently for years after the growth of hard winter wheat in the state was begun, hard winter wheat flour, as such, was unknown to the flour trade.

Although at first discriminated against by them, the millers of the state later encouraged the growth of hard winter wheat. Some of the millers perceived soon after its introduction the stimulus which its adoption would be to increased wheat production and, although it was probably not generally known, there were some who were aware of the superior quality of this wheat.⁹⁷

As the public became educated to the use of hard wheat flour the millers ceased to have the difficulty in marketing it which they formerly had. Furthermore, the superior quality of Kansas hard winter wheat flour gradually became more widely known to the flour trade.⁹⁸ Consequently more far-seeing millers encouraged the growth of the new

96. 13th Biennial Report, K. S. B. of A. page 553.

97. "I found that it was a better yielder and that it stood the drouth and other vicissitudes better than the soft wheat. This caused me to chemically analyze its qualities which showed that it was rich in gluten and produced a very nutritive and palatable bread. Bakery tests confirmed this." - C. B. Hoffman, Kansas Historical Collections. Vol. XII. p. 151.

98. "Kansas hard wheat has qualities that are hard to get from wheat grown in any other section of the country, and that is the strength of its flour. It is a very glutinous wheat and is full of strength." -

New Kansas Magazine, February, 1892.

wheat. The man who probably did most to bring about a wider growth of Turkey hard winter wheat was Bernard Warkenton,⁹⁹ the pioneer miller of Harvey county. He was responsible for the first importation of seed wheat which was sold to farmers of the state in 1885 or 1886. Later many other millers, through the action of the Kansas Millers' Association assisted in the distribution of seed wheat to the farmers of the state.

99. For a brief account of the part which this pioneer miller had in the early history of Kansas milling, see the 13th Biennial Report, K. S. B. of A.

CHAPTER VII.

Reorganization of the Industry 1885-1900

Prior to the early years of the decade 1880-90 the history of the milling industry in the state was, in the main, only a story of the increase of small mills. Flour milling was still in what the Census reports termed the "neighborhood industry" stage of development. Although from earliest times there was a tendency toward increased size and capacity of milling establishments, there was no marked development along this line until after the year 1880.

There were several reasons for this. Chief of these was the fact that before the introduction of hard winter wheat had removed the uncertainty of the wheat crop and greatly increased the annual yield, the scarcity of wheat made large mills virtually impossible. Moreover, before the development of the roller process of milling there was little advantage in operation of a large mill rather than a smaller establishment. Addition of more "runs" of stone increased the possible output but the economies resulting from production on a large scale were, in the old process, insignificant.

The development of the new process of milling in the later years of the decade 1870-80 caused some decline in the relative importance of the small mills of the state. The cost of installing the greater amount of equipment required prevented its adoption by many of the small mills. Moreover, for small establishments the advantages of its use over the old process did not offset the increased capital required to install it. ¹⁰⁰

100. "It is undoubtedly true that for small mills of not over two runs of stone and for small mills running on very soft wheat the two processes may approach each other in efficiency."

— Tenth Census of United States, Manufactures, page 568.

But for mills favorably located with reference to wheat supplies and markets for its flour, on railroads or in the larger towns, adoption of the new process was a stimulus to increased size and capacity of milling plants.

The first blow to the small mill came as a result of the rapid increase in the growth of hard winter wheat. Because of the fact that a satisfactory quality of flour could be produced from soft wheat, by the use of the old process, many smaller mills did not adopt the new process. But as the growth of hard wheat increased it became increasingly difficult to obtain the softer varieties for milling purposes. As stated in a preceding chapter it was impossible to obtain a satisfactory quality of flour from the new wheat, by use of the old process. Hence, it became difficult for the smaller mills to compete with the larger establishments.

But it was the development of the roller process of milling which spelled the doom of the small mill, in-so-far as its importance to the industry as a whole was concerned. It is probable that many mills which had not adopted the new process when it was first developed would have adopted it later in order to have been able to mill the new wheat. But just at the time when hard wheat had practically displaced the growth of softer varieties and mills still using the old process were faced with the alternative either of adopting the new process in order to be able to mill hard wheat or of becoming less and less important in comparison to the larger mills, the roller process of milling was developed.

From that time on, the small mill steadily declined in importance. In those mills which had not adopted the new process, rolls were not, as a

rule, substituted for the old burrstones. The installation of rolls practically involved the construction of a new mill and the cost was in many cases prohibitive. The economies of the roller process were greatest in large mills. It was the fact of these economies which made it increasingly difficult for mills which had adopted the new process to compete with roller equipped mills.

Many small mills continued to operate, however, in sections of the state where competition had not as yet become a serious factor. But the output of such establishments become relatively insignificant as compared to the output of the roller-equipped mills.

Between these years 1885 and 1897 crops were, with but one or two exceptions, very poor. Indeed, this twelve year period is said to have been the most trying for the farmers of any period of similar length in the history of the state.¹⁰¹ The average wheat crop for the years 1880 to 1884 was 31,913,957 bushels reaching in the latter year a new high figure for the state of 48,050,881 bushels. The crop of 1885 amounted to only 10,882,881 bushels, less than one-fourth that of the year preceeding. This crop was ^{the} smallest, not-with-standing the large increase in wheat acreage, which had been harvested since 1874. For the years 1885-1889 the average yield was 17,533,250 bushels, slightly more than half the average crop for the preceding five year period. During the early years of the decade 1890-1900 crops were better. It was not until after 1897 that crops became normal, however.

The welfare of the millers is involved in the prosperity or adversity of wheat farming interests, and the milling industry was very

101. Scofield, Why Kansas Grows Wheat, page 36. M.A. Thesis, University of Kansas.

seriously effected as a result of the short crops during this period. The price of wheat became so high that many millers found it very difficult, if not actually impossible to mill and market Kansas flour in competition with flour from the other states. The cost of wheat in sections of the state where the home grown variety was not available was frequently higher than the Chicago price for wheat. In 1895, which seems to have been the worst year for the milling industry of all this series of short crop years, an Atchison miller paid 2 to 5 cents more per bushel for wheat at the Missouri river than it cost in Chicago or Minneapolis. It was practically impossible to obtain wheat from without the state at a price which permitted millers to operate profitably. Most mills were, in that year, restricted in their operations to the milling of such supplies of wheat as could be obtained locally. Many mills were closed down entirely, and the remainder in general operated on only part time.

The situation was especially severe for the small mills of the state. They were entirely dependent upon local supplies of wheat, and their position was accordingly more unfavorable than that of the larger mills, which, depending upon how general the wheat shortage was, could obtain supplies from other points.

The general financial depression which begun about the year 1888, made more severe in Kansas by continued crop failures also unfavorably affected the industry. In addition to lessened production and smaller profits the millers found it very difficult to obtain borrowed funds. The milling industry is one which at times requires considerable amounts of borrowed capital and the scarcity of funds as

well as the excessive interest rate were very keenly felt by the millers of the state.

The tendency toward increased size and capacity of milling establishments is evidenced by the Report of the Bureau of Labor and Industry for the year 1885, the first comprehensive report to be made on the Kansas Milling industry.¹⁰² The report, although admittedly covering less than a majority of the establishments in the state represented 71 of the 82 organized counties of that time. On that date there were approximately 400 mills in the state, the number having increased very rapidly from 1860 to 1885. However in the ten counties¹⁰³ leading in capital investment and capacity, 36 establishments were reported which although representing but 11% of the mills of the state had a combined capital of nearly one-fourth of the \$8,000,000 capitalization of the entire industry. The capacity of these mills represented only 12 $\frac{1}{2}$ % of the total reported capacity but they very probably ground a much greater percentage of the total amount of flour milled.

102. First Annual Report Bureau of Labor and Industry, 1885. —

103. First Annual Report, Bureau of Labor and Industry, page 132.

Number of Mills, Capital Investment and
Capacity of Ten Leading Counties, 1885.

<u>County</u>	<u>Number Mills</u>	<u>Capital Investment</u>	<u>Capacity</u>
Shawnee	8	371,000	836
Crowley	2	246,000	-
Marshall	4	222,000	525
Harvey	2	150,000	500
Leavenworth	1	150,000	400
Labette	8	132,000	592
Sedgwick	2	132,000	370
Atchison	3	126,000	400
Jefferson	3	120,000	-
Dickenson	3	117,000	414

Shawnee county led with 8 mills of 836 barrels capacity and a capitalization of \$371,000. Only 2 other counties, Cowley and Marshall, had a capital investment in the industry of \$200,000 or more. It will be noted that there was very little relationship between the capital investment and the number of mills in each county. Shawnee county with 8 mills had an average capital investment of \$46,275, while the average investment per mill in Labette county was only \$16,500. On the other hand Leavenworth County reported but one mill but a capital investment of \$150,000.

This wide variation in investment per mill, which existed even in the ten leading milling counties of the state, was a result of the fact that the period was one of transition from small mills to larger establishments. A comparison of the average investment and capacity of the mills in these ten counties with the figures for the state as a whole brings out very clearly the tendency toward increased size and capacity of mills. The average investment per mill of the 36 establishments in these ten counties was \$49,055. The average investment for all mills in the state was approximately \$20,000, less than half as much. The average capacity of the 51 mills in these ten counties which reported it was 130 barrels while that for all mills was only 104 barrels.

Comparative statistics for the industry are available for the years 1885 to 1889.¹⁰⁴ Although based on incomplete returns two general trends in the industry are unmistakably revealed. The first is the decline in the number of mills and capital investment. Estimates based on returns to the Bureau of Labor and Industry placed the number of mills in the state, as stated above, at from 400 to 500 in 1885. By 1889 the number had declined to 224 mills. Capital investment, which in 1885

104. Comparative Statistics for Flour Mills in Kansas
1885-1889

Compiled from reports of the Bureau of Labor & Industry for 1885-1889.

	1885	1886	1887	1888	1889
Total capital reported	\$ 8,000,000	\$ 7,379,950	\$7,923,390	\$6,870,300	\$ 6,401,552
No. bushels grain ground	14,500,000	16,626,891	15,480,392	13,220,482	12,735,434
Average bushels grain ground	62,713	65,980	74,784	73,041	76,260
No. barrels of product		3,196,205	2,936,256	2,670,332	2,556,213
Average barrels of product		13,317	15,293	14,808	15,306
Average amount paid for grain		\$ 39,372	\$ 45,206	\$ 50,780	\$ 57,395
Average value of product		47,951	65,016	67,428	66,039
Average capital investment (24 hours run)		22,919	25,809	28,507	28,578
Average grinding capacity (bbls.)		99	114	119	120

was approximately \$8,000,000, was in 1889 \$6,401,552. The amount of wheat ground declined from 14,500,000 bushels in 1885 to 12,735,434 bushels 5 years later. The industry produced 3,000,000 barrels of products in 1885, while in 1889 slightly more than 2,500,000 barrels were produced.

The second trend in the industry is of more significance than the temporary set-back suffered by the industry as a result of short wheat crops and the financial depression of the times. This was the growth, discussed above, in the size and capacity of mills. The average capital investment per mill increased from \$22,919 in 1886 to \$28,578 in 1889. Reported capacity increased from 99 barrels in 1886 to 620 barrels in 1889, while the bushels of grain ground per mill rose from approximately 62,000 in 1886 to 76,260 in 1889. There was a corresponding increase in barrels of product/^{of}from 13,317 in 1886 to 15,306 four years later.

However, these comparative statistics do not give any indication of the extent to which concentration of the milling industry in large mills was taking place, which during these years was by far the most important development in the industry.¹⁰⁵ This development can best be seen by a comparison of statistics for some of the larger mills of the state with similar figures for the industry as a whole. Statistics for individual large merchant mills are available for the year 1888.¹⁰⁶ Sixteen mills, located in the towns of Atchison, Lawrence, Leavenworth, Topeka and Wichita had a combined capital investment of more than \$1,500,000, an average per

105. The revolution undergone by the milling industry during the last few years in the substitution of the roller process for the time honored burr stone has been severe. The change necessitated large outlays and the result is that in common with so many other industries the business is concentrating in large mills and heavier capital with the extension of the railroads into almost every portion of the state and the superior quality of roller flour the old fashioned local mill is losing its grip. Wheat is shipped in and flour shipped out and the result is that the buhr mill has to shut down or limit itself to custom work."

106. Statistics for 16 largest mills in the state, 1888.
 -- Forth Annual Report, Bureau of Labor & Industry, p. 81.

No. Mills	Location	Value	Days run (12 hours)	Average Days run	Total Capital	Cap. (bbls) (24 hours.)	Average Cap. (12 hrs.)	Sets of Rolls	Burrs
4	Atchison	\$215,000	1,683	421	\$365,000	1,350	169	96	5
2*	Lawrence	135,000	725	362½	210,000	750	187½	47	6
2*	Leavenworth	175,000	1,032	516	305,000	1,100	275	119	3
6	Topeka	325,000	1,894	331	498,000	2,160	180	124	15
2	Wichita	135,000	830	415	165,000	600	150	34	5
TOTALS		985,000	6,164	2045½	1,573,000	5,960	961½	420	34

Location	Bu. Grain Ground	Cost of Same	Bbls. of Flour made	Value of Products	Avg No. Employees
Atchison	852,702	\$618,225.50	184,118	\$832,317.92	68
Lawrence	450,000	285,000.00	90,000	390,000.00	27
Leavenworth	1,200,000	822,500.00	240,000	930,000.00	60
Topeka	1,423,500	968,750.00	306,250	1,221,000.00	103
Wichita	335,000	247,000.00	71,875	347,000.00	29
TOTALS	4,261,202	2,941,475.00	892,243	3,720,317.00	

mill of approximately \$100,000. The total capital investment of all mills in the state was \$7,000,000 approximately; hence these 16 mills of the 250 establishments in the state, represented more than 20% of the total reported capital of the industry. The milling capacity of these 16 mills was 5960 barrels while that for the entire state was 19,617 barrels. 420 of the 1373 sets of rolls in the mills of the state were in the sixteen mills under discussion. These mills ground 4,261,202 bushels of wheat which was 30% of the 13,220,482 bushels ground in all the mills of the state. In that year (1888) there were 2,670,332 barrels of flour milled, the output of the 16 mills being 892,243 barrels. Topeka had, at that time, the largest milling capacity of any city west of St. Louis.¹⁰⁷

Although these years were not in general favorable to the development of the industry, statistics prove that the concentration of the industry into larger establishments continued. As noted above there was a marked decline in the production of flour by the industry as a whole. But this decline was largely confined to the smaller mills. In the milling centers generally there was about as much flour produced as before.¹⁰⁸

The presence of Topeka and Wichita, particularly the latter, in the list of cities known as milling centers is worthy of note. During early days mills were widely distributed throughout the state. But with the westward and southward extension of the wheat belt more large mills were built in the western and southern counties. Decline in the relative importance of the eastern counties in the production of flour led to a

107. Illustrated Topeka - Illustrated Publishing Co. (Topeka).

108. Forth Annual Report, Bureau of Labor and Industry, - page 71.

gradual shifting of the milling industry to the west and south. In 1880 Leavenworth county led in flour production followed in the order of their importance by Atchison, Douglas, Shawnee, Marshall, Saline, Labette, Sedgwick, Lyon and Doniphan counties. Five years later Shawnee County was first in flour production. Four counties which were included in the list of those leading in flour production in 1880 were not included in the ten counties leading in 1885. Two of these, Lyon and Doniphan, both of which are eastern counties were never after considered important milling counties. In place of these were the counties of Cowley, Harvey, Dickenson, and Jefferson, the first three of which are located in the central or southern section of the state, and were destined to become more important in the production of flour in later years. This shifting of the industry westward continued until at the present time a large majority of the mills in the state are located in the central and western counties.

The reason for the construction of more and more mills in the central and western part of the state was the desire to be near the wheat fields. There are obvious advantages of location near the source of wheat supplies. The mills thus located are assured, in normal years, of a supply of milling wheat close at hand, and hence do not have to resort to the shipment of wheat to their establishments from other points. However, this movement would probably not have taken place and the mills of Kansas would not now be so widely distributed over the state had not the milling-in-transit principle been inaugurated by the railroads of the state.

During early days wheat could be shipped much more cheaply than

could flour. Consequently the farther that a mill was removed from the market for its product the greater was the cost of shipment of its flour. Because of this fact, mills located in the eastern part of the state were in a relatively more advantageous position than the mills located in the central or western counties. The principal markets for Kansas flour are in the eastern part of the country. Mills located in the eastern counties could buy wheat in the western part of the state and because of the lower rate which wheat paid than flour sell it at a lower figure than was required by mills located in the interior. Prior to the decade 1880-90 there was little shipment of Kansas flour out of the state, and existence of the differential had little effect on the industry.

With the construction of larger mills in the central and western counties and the development of the flour trade on a larger scale, the growth of competition placed the millers in the central and western parts of the state at a serious disadvantage. Consequently agitation was begun for the removal of the differential between wheat and flour. As a result of this agitation the railroad, during 1892 and 1893, inaugurated the principle of milling-in-transit.

The granting of the privilege of milling in transit permitted a miller to ship wheat to his mill, mill it and ship the flour on to market at the rate charged for wheat, if the mill was in "line of transit" from the point of origin of the wheat shipment to the destination of the flour. To be in line of transit very little deviation from a straight line haul is permitted. Shipments which are not in a more or less direct line, are charged, in addition to the milling-in-transit rate, an "out of line haul" charge also.

The following illustration is typical of the operation of the principle. Salina and McPherson are both milling centers located on the Union Pacific Railroad. Salina is on the Main line of the Union Pacific while McPherson is on a branch which forms almost a right angle with the main line of the railroad. A miller in Salina may purchase wheat in McPherson, ship it over the Union Pacific branch line to Salina, mill it, and then ship it out over the main line of the Union Pacific at the regular milling-in-transit rate. This would come within the classification of a direct haul. But the miller in McPherson will be charged in addition to the regular milling-in-transit rate an "out of line haul" charge if he ships in wheat over the main line of the Union Pacific by way of Salina. The "out of line haul" charge is for the shipment of the wheat from Salina to McPherson and of the flour back to the main line.

Not only did this innovation place the millers of the state on an equality in the marketing of flour and permit the construction of mills wherever it was desired to construct them but the adoption of this principle in other states as well made the position of all Kansas mills much more favorable than they had been before that time. The existence of the differential between wheat and flour had made it possible for Kansas wheat to be shipped out of the state, milled at points closer to the flour markets and sold at lower prices than flour milled in the state could be sold for. The milling-in-transit principle removed this possibility.

The effects of the development of milling-in-transit have been very far-reaching. Without it the milling capacity of the state would

very probably have been centered in the cities in the eastern and northern part of the state, particularly in Kansas City, since it is the natural gateway of the Southwest to the East. Moreover it is improbable that the milling industry of the state would have developed to its present size and importance had this principle not been developed. Millers of the Northwest have the advantage of cheap water rates via the Great Lakes. As stated above this made it possible for millers of that section to buy Kansas wheat, mill it and sell it in eastern markets for a lower price than could Kansas millers. It is not improbable that this situation would have continued and the industry of the Northwest developed at the expense of the industry in Kansas had not the principle of milling-in-transit been developed.

Although development of the milling-in-transit principle materially improved the freight rate situation, freight rates in general were very high and had been so since early days. In fact, the high level of freight rates was one of the chief reasons why it was very difficult for millers of the state during the years of short crops to ship in wheat from other states, mill and sell the flour in competition with mills in other sections of the country.

It was undoubtedly necessary for the general level of rates to be higher during early days because of the limited volume of traffic which the railroads carried. But railroad promotion and operation was at that time characterized by the grossest mis-management and rates charged the public were exorbitant.

However, the general level of rates was not the only cause for complaint, or even the greatest one. With the concentration of milling

capacity in larger mills and the development of a few towns as milling centers the abuses of rebates and discrimination had crept into the treatment of the public by the railroads. Mills which shipped flour in considerable quantities almost uniformly secured more favorable rates than did the smaller establishments. This was especially true where there was competition between two or more roads for the business, for each road tried to secure the greatest volume of traffic possible, and to do so attempted to "underbid" each other for the traffic. The practice of making special rates for favored shippers became so flagrant that smaller mills were at a serious disadvantage in competition with the larger mills thus favored.

Beginning about 1885, there was a general decline in freight rates but the practice of granting rebates continued. ¹⁰⁹ Ten years later there was almost universal complaint by the part of the millers of the state of the discriminatory rates and the unfavorable results for the non-favored shippers. ¹¹⁰

The worst features of the freight rate structure at the time were existence of a differential of 5 cents per hundred weight between wheat and flour and the high export rates from southern ports. The situation placed the millers of the state at serious disadvantage in competition with the Northwestern millers. The distance to the southern points, New Orleans and Galveston is much less than the distance to the

109. 11th Annual Report, Bureau of Labor and Industry, page 32.

110. A miller in Dickinson county wrote (1895), "We have always enjoyed a good business until this year but discriminatory railroad rates here make it impossible for us to do business." This is typical of the complaints made. --- 11th Annual Report, Bureau of Labor & Industry, page 33.

Atlantic ports. But because of the differential, and the high export rates from southern ports, Kansas flour was forced to move through Atlantic ports. This made it more difficult for Kansas mills to compete with mills from the Northwest which could, because of water transportation to the east via the Great Lakes, obtain more favorable rates than the mills of Kansas could get.

The differential, retained by Texas and California at the time when Kansas and other states had removed it in the early 90's, was destined to remain for some time. But the rates on export flour were materially improved. A committee appointed by the Kansas Millers Association visited New Orleans for the purpose of seeing if a new outlet could not be effected for Kansas export flour. The direct result of this was a reduction of ten cents per hundred weight in export rates.

This was of tremendous importance to the development of the export market for Kansas flour. Following the reduction in export rates from New Orleans, reductions were made at other ports, including those on the Atlantic coast, also. As a result Kansas mills were in a favorable position to export flour to all the markets of the world. ¹¹¹

Although conditions were, in general, unfavorable to the development of the industry during the years from 1885 to the end of the century, it was during these years that Kansas flour began to be more widely and favorably known without the state, in both domestic and foreign markets. As noted in the earlier chapter the shipment of flour to other states had begun in 1873. Probably the first shipment of export flour was made in 1882 by the Hoffman mill at Enterprise. In that year the firm sold a

111. 16th Annual Report, Bureau of Labor, page 188.

consignment of flour to a firm in Antwerp, Belgium.¹¹²

Exportation of flour was prevented from assuming any considerable proportions, but the superiority of the Kansas product was quickly recognized abroad. The Yearbook of the United States Department of Agriculture for 1896 contained the following statement with reference to the position of Kansas flour in the markets of the world: "In foreign markets Kansas hard winter wheat flour has already gained a reputation distinctly its own and is classed by some as next to the best Hungarian grades in quality."¹¹³

Consequently the return of normal years for the Kansas wheat crop, beginning in 1897, combined with the general revival of prosperity which took place in the late 90's stimulated exportation to a very marked extent. Prior to this time exportation of Kansas flour was very uncertain,¹¹⁴ but the return to normal crops placed exportation on a sound footing. By 1900 Kansas hard winter wheat flour was marketed in Belgium, France, Sweden, Great Britain, South America and Cuba.¹¹⁵

112. "In 1864 we put some Kansas hard wheat flour on the market in Paris, France. The bakers of that city, famed for its good bread pronounced it the only flour equal to Hungarian hard wheat flour ever offered them." C. B. Hoffman— 16th Report, Bureau of Labor, page 188. —

113. Yearbook, U. S. Dept. of Agriculture—1896— page 492.

114. The milling business has not been in a flattering condition the last few years, as a great deal of flour is sold at manufacturing cost and some below and the fluctuation of wheat prices last summer caused a great loss to millers. The flour export has been very uncertain the last few years and the competing points are very sharp all round.

—Eleventh Annual Report, Bureau of Labor, 1896, page 86.

115. 16th Annual Report, Bureau of Labor and Industry, page 182.

The superiority of Kansas hard winter wheat was recognized at home as well as abroad. Evidence of the recognition of this superiority was given by millers of the Northwest in the year 1900. During that year these millers were unable to obtain enough wheat in the Northwest to keep their plants in operation, and at once began buying hard winter wheat of Kansas and Oklahoma. They milled this wheat and marketed it in the east under their own brands which had long enjoyed the reputation of being "standard." This caused general indignation among Kansas millers and wheat growers and the publicity which followed resulted in the general denunciation of the action of the Northwestern millers, not only in this country but abroad.

The publicity thus obtained for Kansas flour combined with a campaign of education designed to spread knowledge of the quality of Kansas flour resulted in a much wider use of the product of Kansas mills.¹¹⁶ Once acquainted with the quality of Kansas flour, its position and reputation with flour users was assured. During the late years of the decade 1890-1900, and the early years of the twentieth century, Minneapolis patent, so-called, lost the leadership which had been undisputed for so many years, and Kansas hard winter wheat flour became a worthy rival of the mills of the Northwest in the sale of flour in the markets of the world. However, it was not until about 1907-1908 that Kansas flour commanded a price equal to that obtained for Northwestern hard wheat flour, although after that date it not unfrequently commanded higher prices than the product of the mills of the Northwest.¹¹⁷

116. 16th Annual Report Bureau of Labor and Industry, page 185-6.

117. Kansas Historical Collection, vol. XI, page 157.

CHAPTER VIII.

Development of the Industry 1900-1925.

The flour milling industry in Kansas has had its greatest growth within the last 25 years. Indeed, it can be said that the great commercial importance of the industry has been a development of only the last ten or fifteen years. During the closing years of the last century and early years of the present one there was a very material improvement in conditions affecting the industry, and in consequence the beginning of a growth which has brought the Kansas milling industry to its present size and importance.

Towards the end of the decade 1890-1900 there was a revival in mill construction, which had been halted by the adverse conditions which existed from 1885 to near the close of the century. The Eleventh Census (1890) reported 348 mills in the state. In 1900 the number of establishments reported was 533.¹¹⁸

The classification of most significance which was made in the Twelfth Census was based on whether or not flour was the product of chief value. There were 260 establishments in which flour was the product of chief value.

Doubtless, all, or a very large proportion of the 190 merchant mills which were included in the total of 533 mills produced flour as the product of chief value. Hence statistics for the group of 206 mills were practically those for the milling industry of the state.¹¹⁹

118. This figure however is for all milling establishments in the state regardless of type or capacity and included a large number of very small mills, the combined output of which was insignificant compared to the production of the larger mills. A large number were custom or exchange mills doing a purely local business on a very small scale. The 533 establishments were classified as follows: merchant 190; custom or exchange 137; both custom or exchange and merchant 206; total 533.

119. Twelfth Census of the United States, Vol. IX, page 359.

The Census report for 1905 contained separate statistics for merchant mills both for that year and for 1900 making possible a comparison
120
as of those dates. In 1900 there were 238 merchant mills in the state which used during that census year 23,328,314 bushels of wheat in the production of 5,008,764 barrels of flour; in 1905 there were 248 merchant mills reported which ground 36,197,651 bushels of wheat in the production of 7,633,415 barrels of flour. While the increase in number of milling establishments was insignificant, there was a 48% increase in production of flour, the greater part of which was made by the larger mills at the expense of small establishments. The declining importance of the small mills in the state is shown by the increased percentage which production of merchant mills was to total output. In 1900 65% of the production of all mills in the state was by merchant mills; in 1905 it had increased to 80%.

The Thirteenth Census of the U. S. (1910) reported 501 mills, all of which were classed as merchant mills. A separate report was made for grist mills but only 39 such establishments were listed and it is certain that a large number of such mills were included in the report for merchant mills. 121 Hence this classification has no significance as an indication of the number of mills in commercial importance in the state.

120. The twelfth census did not give statistics for merchant mills, although the number of such establishments was given. Apparently, a new basis for classification was used in the report of 1905, as the number of merchant mills, reported by the twelfth census as 190, was in the report of the census for 1905 given as 238. However, this increases the value of the comparison which can be made by insuring that the same basis of classification has been used.

121. "Many mills although classed as merchant mills because they buy grain and sell its products, serve purely local markets and have little commercial significance."

However a separate classification was made in the Thirteenth Census for mills producing 1000 or more barrels of wheat flour during the census year 1910. Of the total number of mills reported, 501, only 209 produced 1000 or more barrels of flour during that year. These 209 establishments used 49,607,646 bushels of wheat in the production of 10,879,028 barrels of flour, or approximately 77% of the total production of all mills in the state. Statistics for mills producing 1000 or more barrels of flour were practically those for the milling industry of the state.¹²²

In 1914 the Census of Manufactures reported 360 mills in Kansas. Statistics were again given for mills producing 1000 or more barrels of flour. There was a marked decline in number of such establishments between the years 1910-1914, of from 209 to 172. Notwithstanding this decline in number of such establishments the percentage of production by them of total production remained approximately the same as in 1910. The number of barrels of wheat flour produced by all the mills in the state was in 1914, 12,777,582, an increase of approximately 2,000,000 barrels or 20% during the five years.

In 1920, 585 mills were reported for the state by the Fourteenth Census. The number of mills producing 1000 or more barrels of flour increased from 172 in 1914 to 190 in the latter year, a result doubtless of the stimulated demand and high prices resulting from the war. Statistics for mills producing 1000 or more barrels of flour are not given, but

¹²². According to the Report of the Census, mills manufacturing 1000 or more barrels of flour, produced, for the entire country, 93.44% of the output of merchant mills and 99.3% of the value of products of all merchant mills. Hence, the figures given for output and value of products for the 209 Kansas mills producing 1000 or more barrels of flour were practically those for all mills of any commercial significance, in the state.

production for that year exceeded that for any preceding year. 15,577,549 barrels of flour were manufactured by all the mills in the state, compared to 12,777,582 barrels in 1914. In 1921 production declined to 12,375,216 barrels, but the following year reached a new high figure for the industry of 16,065,371 barrels. In 1923 the output of the mills in the state was 15,442,713 barrels, dropping a year later to 13,777,314.

Two developments in the industry, both of which were begun before 1900, have been very marked in the last twenty-five years. One is the tremendous growth of the industry. In 1900 the production of the Kansas mills, was less than 7,000,000 barrels. In 1920 it had increased to more than 15,000,000 barrels.

The other development has been the decline in importance of the small mill and the concentration of the milling capacity of the state in larger and larger mills. As pointed out in the preceding chapter the adoption of the roller process spelled the doom of the small mill, although for a number of years many were still to be found in the state. It is possible that the development of the roller process for a time retarded development of the industry. It became more and more difficult for burr mills to compete with roller equipped establishments. It was impracticable to install roller equipment in the smaller mills, and the increased capital required prevented the construction of larger mills. In the year 1900 only 24% of the Kansas wheat crop was milled in the state. ¹²³

123. "The inability of the smaller mills to cope with the larger ones in the manufacture of flour products, together with a variation of rates for long hauls has made it difficult for the milling industry to extend as rapidly as circumstances would seem to warrant, for although Kansas raised 84,486,655 bushels of wheat in 1900, or 3.3% of the crop of the world, only 24% of the Kansas crop was ground by the millers in the state."

—Twelfth Census of U. S., Manufactures, page 259.

There was also a tendency from the first towards increasing size of roller-equipped mills, because of the greater economies in the operation of the large mill. The mill of 200 barrels or less capacity is too small to permit the use of the more expensive but efficient machinery which the large mill can profitably use. Stocks (ground wheat) which in the larger mill will produce flour in worth-while quantities cannot be used profitably in the small mill because of the expense involved. Hence the cost of flour production in the small mill of 200 barrels or less capacity is greater than in the larger mill.

The flour milling industry is, up to a certain point at least, characterized by increasing returns. This is the result of the fact that the capacity of a mill can be increased for an outlay proportionately less than was required to build the mill originally. To increase the capacity of a milling plant, a few new rollers, additional purifiers and other equipment will be needed but to a large extent such increased capacity can be obtained by a fuller use of the existing plant. Hence, the profits of a mill, assuming that the management of the enlarged establishment will be as efficient as it was before, will be increased by enlarging its capacity. Undoubtedly the fact that milling is very well adapted to methods of large scale production has been one of the chief reasons for the rapid growth of the industry in the state.

The overhead charges of a large mill are also relatively less than those of the smaller ones. The office force required by a mill of 700 or 800 barrels capacity will not be much more expensive to maintain than the office force required by a mill of 400 or 500 barrels capacity, at least the additional expense involved will be less than proportional to the

increased capacity of the plant. Neither is the additional expense involved in the sales of a larger output, proportional to the increase in amount of products which are sold.

The large mill also has an advantage over the smaller one in the purchase of wheat for lower prices than the small mill must pay. A majority of the larger mills in the state maintain elevators and grain buying stations throughout the state and by keeping in touch with market conditions in the territory covered by its agents, can take advantage of any situation which will make it possible to obtain wheat for a lower price than it might be required to pay elsewhere. One of the larger milling companies of the state has forty elevators located at various points in the wheat belt of the state, the purchasing operations of which are directed from the company's offices in Kansas City. The company keeps in very close touch with market conditions in each of the 40 territories in which the mills are located. If for any reason the price declines at any of these stations purchases are made in large quantities, if possible. It is the purchase in large quantities which gives the large mill a distinct advantage over the small mill, for variation in market prices is never very great. If a large mill does not have grain elevators it has buying connections with grain brokers by which it is possible to purchase wheat in large quantities at a lower price than the small mill is required to pay, which of necessity must purchase in smaller quantities. The expense of maintaining lines of grain elevators is heavy and only the larger establishments can afford to do so. There is a belief in some quarters that the maintenance of such lines of elevators is not profitable. However, the necessity of obtaining

supplies of grain virtually compel it, and about 50% of all the mills in the state own grain elevators.¹²⁴

However small mills, of 200 barrels or less capacity, have not entirely disappeared, notwithstanding the advantages which the large mill has over the smaller ones. These are several reasons why such mills continue to operate. Perhaps the most important one is the fact that such establishments are often owned and operated largely by the members of one family who take their wages in the form of profits. Such an arrangement materially reduces the cash outlay required to operate the mill, although the real profits may be and undoubtedly are, small. But during dull seasons for the millers when the expenses of the larger mills continue to a large extent, whether or not the mill is operated, the small mill has very little expense.

There are also money expenses incident to the operation of a large mill which the small ones do not have. The small mill does not require an expensive office force. Neither are sales forces generally maintained, which is an item of considerable importance in the expense of large mills. Another cost of operation not shared by the small mills is that involved in the maintenance of laboratories which is a development of recent years.

A situation from which the small mills profit at the expense of the large ones, as pointed out by the Editor of the Modern Miller is in the matter of advertising programs and campaigns designed to benefit the industry as a whole, which are carried on by various Millers' Associations and Clubs. Campaigns designed to increase the popularity of hard winter

124. C. V. Topping, interview.

wheat flour through the medium of advertising are examples of such work. These advertisements do not contain the names of any millers or milling concerns.

But the advantages of the small mill over large ones are not great enough to offset those resulting from large scale operations. The number of mills of 200 barrels or less capacity has declined steadily in recent years. In 1909 there were 135 such mills. In 1919 the number had dropped to 93; June 30, 1924 there were only 60 such mills in the state. In 1909 these mills had 19% of the total milling capacity of the state; in 1924 this had dropped to 5.9%. During this time the output of such mills dropped from 16% to 3.4% of the total output for all mills. ¹²⁵

The tendency towards concentration of the milling capacity of the state in larger establishments, and the declining importance of small mills, however, have not led to the construction of milling establishments which are comparable in size to many found in the Northwest. Kansas has the largest number of well equipped flour mills of any other state in the Union, but the majority of Kansas mills are of moderate rather than large size.

While there are, as pointed out above undoubted advantages in large scale milling operations, those advantages do not prevent a mill of 500 barrels or more capacity from operating successfully in competition with larger mills. A mill of 500 barrels capacity can operate just as efficiently in-so-far as the production of flour is concerned as mills of larger capacity.¹²⁶ Such mills are large enough that profitable use can be made of all the equipment and processes found in larger mills.

126. R. C. Jackman, interview.

125. Kansas mills of more or of less than 200 barrels capacity, with percentage which each group represents of total capacity and total production. 1909-1924.

Years	Over 200 bbls.		Less than 200 bbls.		All mills		Percentage of production by each		Percentage of Capacity by each	
	No.	Capacity	No.	Capacity	No.	Capacity	Over 200 barrels	Less than 200 barrels	Over 200 barrels	Less than 200 barrels.
1924	102	82,825	60	5,249	162	88,074	96.6	3.4	94.1	5.9
1923	113	87,545	65	4,949	179	92,494	97.2	2.8	94.6	5.4
1922	107	84,995	68	5,520	175	90,515	96.8	3.2	93.9	6.1
1921	112	78,050	93	7,324	205	85,374	95.3	4.7	91.5	8.5
1920	110	78,140	96	7,554	206	85,694	95.6	4.4	91.2	8.8
1919	110	74,020	93	7,399	203	81,419	95.0	5.0	90.9	9.1
1918	112	65,690	96	7,355	198	73,045	94.7	5.3	89.9	10.1
1917	94	59,500	62	5,852	156	65,352	95.	5.0	91.1	8.9
1916	90	58,560	69	5,247	169	64,807	94.	6.0	91.9	8.1
1915	99	55,380	78	7,240	177	62,620	93.	7.0	88.5	11.5
1914	98	53,835	66	6,500	164	60,335	93.	7.0	89.3	10.7
1913	102	51,635	80	7,865	182	59,500	93.	7.0	86.8	13.2
1912	104	53,760	87	8,380	191	61,140	93.	7.00	86.3	13.7
1911	108	54,625	103	9,245	211	63,870	88.	12.0	86.	14.
1910	107	51,725	118	10,640	225	62,375	84.	16.0	82.9	17.1
1909	104	49,935	135	11,740	239	61,675	84.	16.0	81.	19.

Compiled from figures in "The Millers Almanacs"
-1925- page 225 and 1924, page 213.

In 1924, of the 162 mills in the state, 102 were of more than 200 barrels capacity. ¹²⁷ Of this number 74 had a capacity of 200 to 1000 barrels, only 28 mills having a capacity greater than 1000 barrels. There were more mills of 500 to 1000 barrels capacity than of any other size.

During the years from 1918 to 1924, however, there was an increase in the number of large mills. In 1918 there were 47 mills of 200 to 500 barrels capacity; in 1924 this number had declined to 31. But the number of establishments of 500 to 1000 barrels capacity increased from 31 to 43. The number of mills of 1000 barrels or more capacity increased from 24 to 31 in 1920 although dropping back to 28 in 1924.

Although there are fewer establishments of more than 1000 barrels capacity than in any other group of 200 or more barrels capacity, the capacity and output of the larger establishments was approximately twice that of any other group and more than half the total capacity and production of all the mills in the state. From 1918 to 1924 the capacity of such mills in relation to that of all the mills steadily increased. However, the increase in production by these mills is more striking than the increase in capacity. In 1918 such mills milled 5,230,223 barrels of the 10,901,449 barrels of flour produced in the state. In 1924 8,241,558 barrels of the 13,777,314 barrels of flour produced in the state were milled by establishments of 1000 barrels or more capacity. This very clearly shows the growing importance of the larger mills.

127. Numbers, Capacity, rating and Yearly Production of Kansas Mills,
1918-1924*

1924 - Year ending June 30:

Number of Mills	Capacity ratings.	Daily capacity in barrels	Flour made - (barrels)	Wheat ground (bushels)
28	1000 and over	47,170	8,241,558	57,444,297
43	500 to 1000	26,560	3,869,093	17,659,395
31	200 to 500	9,095	1,193,163	5,314,540
28	100 to 200	3,675	348,188	1,619,718
32	Less than 100	1,574	125,312	580,043
162	TOTALS	88,074	13,777,314	62,617,993

1923 -

29	1000 and over	48,705	8,802,019	40,704,155
43	500 to 1000	26,705	4,512,336	20,517,489
41	200 to 500	12,135	1,688,122	7,643,434
22	100 to 200	2,820	274,252	1,276,622
44	Less than 100	2,129	165,984	760,785
179	TOTALS	92,494	15,442,713	70,902,485

1922 -

30	1000 and over	48,965	9,203,771	41,758,130
39	500 to 1000	24,225	4,660,034	21,225,696
38	200 to 500	11,805	1,699,046	7,758,366
29	100 to 200	3,725	386,317	1,753,961
39	Less than 100	1,795	116,203	540,497
175	TOTALS	90,515	16,065,371	73,036,650

1921-

29	1000 and over	40,575	6,667,884	30,419,332
38	500 to 1000	23,455	3,534,458	16,093,940
45	200 to 500	14,020	1,697,676	7,740,398
39	100 to 200	4,879	359,982	1,648,556
59	Less than 100	2,445	115,216	532,366
205	TOTALS	85,374	12,375,216	56,434,592

1920 -

31	1000 and over	43,650	8,534,527	39,196,279
36	500 to 1000	21,080	4,118,748	19,281,631
43	200 to 500	13,410	2,233,993	10,362,580
41	100 to 200	5,045	513,316	2,362,410
55	Less than 100	2,509	176,965	821,440
206	TOTALS	85,694	15,577,549	72,024,340

1919 -

Number of Mills	Capacity ratings.	Daily capacity in barrels	Flour made (barrels)	Wheat ground (bushels)
27	1000 and over	38,080	6,780,220	30,070,361
35	500 to 1000	21,130	3,624,960	16,244,044
48	200 to 500	14,810	2,205,651	9,897,603
40	100 to 200	4,935	495,635	2,209,051
53	Less than 100	2,464	164,727	751,768
203	TOTALS	81,419	13,271,193	59,142,807

1918 -

24	1000 and over	32,550	5,230,223	23,558,669
31	500 to 1000	18,800	2,991,940	13,642,019
47	200 to 500	14,340	2,106,651	9,485,135
39	100 to 200	2,725	429,273	1,887,828
57	Less than 100	2,630	143,362	660,195
198	TOTALS	73,045	10,901,449	49,223,846

— Millers' Almanac and Yearbook, published by
The Northwestern Miller, 1925, page 224.

CHAPTER IX

The Operation of Kansas Mills

Beginning about the year 1900 there was a gradual decline in freight rates on the railroads in the state. Early in the present century, also, the abuses of discrimination and granting of rebates to favored shippers were discontinued and there has been very little complaint in recent years of freight rates on the railroads of the state. In 1913 an attempt was made by the railroads to regulate the shipment of wheat milled-in-transit. This was not an attempt to curtail the privilege of milling-in-transit, but it would have caused a great deal of confusion to the millers and as a result of their protests, the proposed change was not put into effect.

However, there has not been such general satisfaction with the rate situation outside the state, as it affects the Kansas milling industry. The reason for dissatisfaction is the fact that millers of the Northwest are given lower freight rates on shipments to the east than Kansas mills must pay to the same points.

Northwestern millers early obtained an advantage in this respect and have always had lower rates than the millers of the Southwest, although in recent years this advantage has not been so great. Before the World War the Minneapolis-Chicago rate was only two cents lower than the rate from Kansas City to Chicago. During the war percentage increases in rates were made, however, which resulted in the northwest securing a greater advantage over the Southwest. At the present time this advantage amounts to $4\frac{1}{2}$ cents per hundred pounds and Southwestern millers are attempting to obtain a readjustment which will place the two sections more nearly on an equality.

A recent proposal from the Northwest for a rate adjustment would result, if carried into effect, of discrimination against the millers of the Southwest amounting to 12 cents per barrel on shipments to the east.

"This would be a blow to Southwestern millers, to the wheat growers in their territory and to eastern flour buyers. It would be a stimulus to the wasteful out-of-line hauls by which wheat goes out of the Southwest to Northwestern mills for grinding."¹²⁸

The railroads maintain that rates from the Northwest must be lower than those from the Southwest, because of water competition on the Great Lakes. However, it is the opinion of Southwestern millers that this necessity is over-emphasized. The editor of the Southwestern Miller is of the opinion that a readjustment of rates from the Northwest upward would have little effect on the amount of business done by the railroads in that section of the country.¹²⁹ A certain amount of flour will move by railroad anyway and increases in rates which would bring about rate equality in the two sections would probably not materially affect the business of the railroads.

Regardless of whether or not rate equality should be granted, the two sections, the fact remains that the freight rate situation is one of great importance to the milling industry of Kansas and the Southwest. In answer to the contention of Northwestern millers that the competition of Buffalo and other centers made a rate adjustment downward necessary, The Southwestern Miller in a recent issue contained the following:

"The grain and milling interests of the Missouri river and of the Southwest generally encounter the same identical competition with

128. The Southwestern Miller, July 28, 1925, page 21.

129. Samuel Sosland--Editor, The Southwestern Miller, interview.

Buffalo and other centers in the sale of their products in Atlantic sea-board and New England territories. We are in constant competition with shippers located in the Northwest and if any readjustment must be made in the rates from the Northwest to the East, corresponding readjustments must be made in the rates from the Missouri river and the Southwest, or irreparable damage and injury will be done to that large grain producing section."¹³⁰

Although the question of freight rate equality for the two sections is of tremendous importance to the Kansas millers, the difficulties in the way of a settlement which will be satisfactory to the Southwest are being ironed and a satisfactory adjustment will probably be made.

Kansas mills normally grind about 70,000,000 bushels of wheat annually, 20,000,000 to 30,000,000 being shipped out of the state to be milled elsewhere. However, if the crop is light milling operations are curtailed, particularly in the area in which the crop shortage exists. The mills of the state depend very largely on Kansas wheat for milling purposes. Some wheat is shipped in but in normal years, this comprises but a very small percent of the wheat used. The Kansas crop does not come on the market in quantities until after July 1. The Oklahoma crop begins to be marketed in June and some of this wheat is purchased by Kansas mills. From that time until the first of the year Kansas mills operate practically full time. After January 1 until the arrival of the new wheat crop the mills of the state are operated about one-half time.

However, operation of the mills in the state varies considerably

130. The Southwestern Miller. July 8, 1925, page 24.

from year to year. They have been built to mill the wheat crop raised in normal years, and to sell flour under conditions of normal competition. Such conditions do not always exist. Wheat and flour prices are subject to the action of world wide supply and demand. Consequently, crop and market conditions not only in Kansas but in the other states and in foreign countries, also affect the industry.

Mills located in the eastern part of the state are more favorably situated in times of short crops than the mills in the central and western part of the state. The flow of flour and wheat is normally toward the east, and mills in this section of the state can draw their supplies from the entire state. On the other hand, mills located in the interior may find it difficult or impossible to obtain wheat for milling purposes at milling-in-transit rates. However millers are not, on the whole, unfavorably situated in this respect. Both Oklahoma and Nebraska produce wheat in considerable quantities. Missouri and Colorado also produce wheat and in times of crop shortage in Kansas, supplies may usually be obtained from nearby states.

It is not to be implied that the privilege of milling-in-transit must always be taken advantage of by mills. This would of course, be impossible. It is only when wheat must be shipped to a mill from without the state that it becomes practically essential to do so. Otherwise the cost of production is so high that it is difficult to market the flour in competition with flour produced elsewhere.

Kansas mills operate almost entirely upon the receipt of orders for flour. The risk involved in the purchase of wheat and milling of flour without contracts for its sale is so great that millers refuse to

to take it. There is the ever present possibility of a drop in wheat and flour prices, which considering the narrow margin of profit upon which mills operate might result in considerable loss to millers. Hedging only sets a limit to possible loss and is not full protection against this possibility.

The sale of flour is made to a large extent by sales forces which are maintained by practically all the larger mills. Sales by small mills are usually made through flour brokers. Large mills sell, to some extent through brokers also. In foreign markets, sales are made either by representatives of the milling companies or by their agents.

Kansas flour is marketed practically all over the world. In the domestic market it is sold in all parts of the country with the exception that little is sold in what is called the spring wheat territory, of the Northwest. Incidentally little Northwest flour is sold in Kansas. The product of Kansas mills has some difficulty in competing with flour from the Northwest in the New England States and on the Atlantic sea-board, because of cheaper transportation from the Northwest, but it is regularly sold there. The product of Kansas mills is so widely used that it is practically impossible to say that any one state or section of the country is the largest user of the Kansas flour. About 80% of the flour milled in the state is sold in domestic markets.

In normal years about 20% of the output of Kansas mills is exported.¹³¹ In 1924 the wheat crop of the state was large amounting to 103,000,000 bushels and the export trade in Kansas flour was brisk.

However, the crop of 1925 was only 60,000,000 bushels and the high price prohibited the exportation of flour milled from it in competition with flour

131. Quarterly Report, K.S.B of A. Sept. 1920, page 179.

produced in other sections of the county and in other wheat producing countries. Flour quotations during July, 1925 were at times as high in Kansas as they were in Liverpool.

The Continent and the West Indies are the largest export markets for Kansas hard winter wheat flour. Others of more or less importance are the small countries at the eastern end of the Mediterranean sea, and Iceland. Until the last few years the spring wheat millers of the Northwest controlled the flour trade with the West Indies. At the present time however about 60% of the flour imported by the islands is the product of Kansas mills.

Kansas hard winter wheat is in very high favor with European importers because it has probably, the best all round qualities needed for both household and bakery purposes.¹³² It is generally mixed with soft wheat flours from Australia, Argentine, the Indies or those made from native soft wheat to secure the desired blend. All grades of Kansas flour, which are designated patent, first clear, second clear and low grade, find a market abroad. However, first and second clears are usually more readily saleable abroad than in domestic markets. Not as fine quality is as a rule, desired by the export market and "export patent is ordinarily a 95% to 100% grade. Shipments are almost always made under a mill brand, although occasionally a buyer prefers to receive the flour in unbranded sacks or under a brand of his own. It is customary for American millers, at the beginning of the season to furnish their foreign representatives or agents with samples of the various grades of flour which they will sell during the season, subsequent purchases being made on the basis of these samples.

The export trade in flour is conducted mainly under the terms of the

132. Quarterly Report K.S. B. of A., Sept. 1920, page 129.

London Flour Trade Association. For the purpose of legal proceedings and the settlement of questions arising in the fulfillment of contracts transactions are considered to have been made in England and subject to English law. All purchases of flour are effected by cable, the receiver of an offer having 24 hours in which to accept. Bids and offers are made in the currency of the buyer's country.

The export trade is entirely on a wholesale basis. Orders for large quantities covering a considerable period of time are taken by Kansas mills. Such orders are often for 10,000 to 30,000 bags or more of 140 pounds each. It is usually designated that shipment shall be made either at any time during a given month or during the first or last half of a given month. Time of shipment is determined by the date of the bill of lading. Export shipments of flour usually move through bills of lading which cover both railroad and ocean transportation, although it is not uncommon for the shipper to exchange the railroad bill of lading for a steamship bill of lading.

Although in domestic shipments insurance is not ordinarily carried, export shipments are usually insured against all risks, the shipper being compensated for loss from any cause what-so-ever. It is customary to insure the flour for 5% or 10% in excess of the invoice value in order to compensate the buyer for loss of profit resulting from his inability to make deliveries to his customers.

Although in domestic markets flour sales are in many cases made on 30 days time, about 77% of export flour is settled for by arrival drafts and perhaps 20% by time acceptances. Possibly 3% is sold on account. ¹³³
When the customer is in good standing in the flour trade, the draft is

drawn upon the buyer and the shipping documents are surrendered to him upon his acceptance of the draft. In other cases the drafts are accepted by foreign banks with which the importers have established credits. A less common practise is for importers to instruct foreign banks to establish dollar credits for them with New York banks. The exporter may then have the draft accepted by the New York bank. The documents accompanying drafts are the invoice, the bill of lading, insurance certificate and letter of hypothecation. The routes followed by Kansas flour in domestic shipments are as many as there are railroad lines leading from the state. However, because the largest market for flour is in the east, Kansas City is a natural gateway for flour shipments. Export shipments move largely through Gulf ports. The time required by a shipment made through an Atlantic port to England or the continent is usually 15 or 20 days; shipments made through Gulf ports require 5 to 7 days longer. As the peak of the export movement of flour often coincides with heavy movements of grain, there are often serious delays in transit between the mill and the port through which the shipment is to be made.

A situation existing in the Kansas milling industry which is not generally understood, is the over capacity of the mills in the state. For many years the capacity has been much greater than the output of any one year. For the last 16 years the annual production of flour has been only 50% to 60% of the possible output.¹³⁴ In 1908 the production was 51.1% of capacity; in 1924 it was 53%, the average for the 16 year period being 57.2%. The percentage of output to full capacity has been lowest in small mills. In mills of less than 500 barrels capacity, production was only 39.9% of capacity while for mills of 500 barrels or more capacity the percentage was

134. Percentage of output to capacity of Kansas Mills,
1908-1924.

Year	1000 and over	500 to 1000	200 to 500	100 to 200	Less than 100	Average
1924	58.0	49.0	43.0	31.0	26.	53.0
1923	53.0	56.0	46.0	32.0	26.0	55.0
1922	62.0	64.0	47.0	34.0	21.0	59.0
1921	54.7	50.2	40.3	24.5	15.7	48.3
1920	65.2	65.1	55.5	33.2	23.5	60.6
1919	59.3	57.0	49.6	33.4	22.3	54.3
1918	53.5	53.0	48.9	30.2	18.1	49.9
1917	64.0	68.0	58.0	36.0	26.0	61.0
1916	68.0	64.7	62.3	38.5	30.5	62.8
1915	70.5	71.8	63.6	39.3	28.6	67.0
1914	69.6	61.0	64.4	38.6	28.0	62.7
1913	67.5	64.0	60.7	30.5	32.2	59.8
1912	55.3	59.3	53.7	28.0	27.2	51.4
1911	57.2	63.8	52.0	30.1	27.2	53.2
1910	53.0	63.0	59.0	44.0	29.0	54.5
1909	50.0	68.5	62.1	41.0	36.1	56.1
1908	62.5	64.0	60.0	42.6	26.7	51.1
Average	60.6	62.7	57.2	35.0	27.6	57.2

-- The Millers Almanac, 1925, page 225
published by the Northwestern Miller.

61.6. These larger mills, which in 1924 produced 12,111,651 barrels of the 13,777,314 barrels of flour milled in the state had capacity to produce 19,661,700 barrels of flour.

The reason for this situation is not that milling capacity has been accidentally over-expanded, but is in the fact that it is to the interest of the miller to be able to turn as large a volume of production as possible during the early months of the milling season. Doubtless in the last analysis the explanation for the situation is the relatively high rate of profit made by millers. There is a rather definite limit to the demand for flour. Until about January 1, demand is brisk, but after that date it falls off. Consequently, millers wish to share in the satisfaction of that demand as much as possible.

Probably this situation, which is general throughout the industry, has developed because, as pointed out in the preceding chapter, the cost of increasing the capacity of a mill is much less than that involved in the construction of the original mill. This makes it possible to increase the rate of profit by increasing the output.

However, there are other considerations which perhaps are part of the explanation. Grain cannot be stored by millers for future use, so that mills could operate at full capacity throughout the year. Fluctuations in the price of wheat makes the risk of loss too great to permit it. Hedging as noted above is commonly practised but only sets a limit to possible losses and is not full protection against them.

There have been within comparatively recent years two developments of considerable importance to the industry. One is the tendency toward concentration of the milling industry, through consolidations and mergers, in a few very large milling companies. At present there are only two such large concerns in the state one of which was formed in 1912 and the other in 1916. Millers express the opinion, however, that there will be greater development along this line in the future.

The economies resulting from the increased scale of milling operations are probably greater than those to be obtained in many other industries. An executive of one of the two large milling firms in the state listed the advantages of large scale operations under three heads. 136
The first is the economy resulting from the central management and control of the various milling establishments operated by the company. The overhead saving thus effected is considerable when a number of mills are involved. The second advantage is in the purchase of wheat and marketing of flour, the latter especially. In times of crop shortage or marked departure from the normal quality of wheat; an individual mill may find it very difficult or impossible to mill the quality of flour which it has previously sold the trade, and as a result may injure the market for its flour. However, instead of selling flour as the product of some particular mill, the large firms develop certain brands of flour which are produced by the mills most favorably located with respect to supplies of wheat of the quality needed to produce such flour.

The third advantage is a financial one. Because of the superior financial standing of the large milling firm, loans may be usually obtained

by it at a lower rate than smaller mills are required to pay. The milling industry is one which at times requires the use of borrowed funds, and the aggregate saving is a material one.

In recent years there have been a large number of mergers and consolidations of baking interests, and at the present time a few huge corporations supply a large percentage of the baking products used in the entire country. In the opinion of the Editor of the Southwestern Miller this is creating an abnormal situation in the marketing of flour. Formerly a large number of mills shared in the business of supplying bakeries with flour. As a result of centralized purchasing by the large baking corporations, a relatively few mills now supply them with flour. Hence there is keener competition among mills for the business. The mills which share in the business of the baking companies will probably increase in size at the expense of the smaller establishments, if this movement continues.

The other development is the increasing competition of Canadian wheat flour in the marketing of the Kansas product. This competition is not so keenly felt in domestic markets because of the superiority of Kansas flour and the protection afforded by the tariff.

In foreign markets, however, this competition is much keener. Because of its lower cost of production Canadian flour can be sold at lower price than the Kansas product, and unfortunately, the superiority of Kansas flour, although freely by foreign importers does not, as in domestic markets, serve as an inducement to its purchase. In fact as noted above, European markets demand a flour of inferior quality, the cheaper grades of Kansas flour finding a more ready sale abroad than they do in domestic markets.

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