7-1-1949

Farm Mechanization in The Red River Valley 1870-1915

Asbjorn B. Isaacson

Farm Mechanization in the Red River Valley
1870-1915

A Thesis

Submitted to the Faculty of the Graduate Department

of the

University of North Dakota

by

Asbjorn B. Isaacson

In Partial Fulfillment of the Requirements for the

Degree of Master of Arts

July, 1949

University of North Dakota

July, 1949.

This thesis, presented by Asbjorn B. Isaacson, in partial fulfillment of the requirements for the degree of Master of Arts, is hereby approved by the Committee on Instruction in charge of his work.

Committee on Instruction.

George F. Lemmer

A. J. W. Bjork

Bernt L. Wills

_____

_____

J. W. Breitwieser

Director of the Graduate Division.

Acknowledgment

The writer wishes to express his appreciation for the assistance of the several people who have made this study possible. Especial acknowledgment is due to Dr. George Lemmer, whose constant advice and encouragement has been invaluable.

The writer wishes, also, to extend his appreciation to Mr. Knute Nygard, Mr. Lars Larson, Mr. N. N. Nelson, and Mr. Carl Riboski, Red River Valley pioneers, who kindly granted interviews, and to Mr. Joe Goeller, Mr. Comart Peterson, and Mr. Joe Johnson, who assisted with the more modern aspects of the study. Mr. Ansgorde Haaland kindly allowed the use of his valuable collection of old magazines and catalogs, a contribution which proved very helpful in completing this work.

Asbjorn B. Isaacson

Preface

The story of the mechanization of the American farm lands, as exemplified by the history of the Red River Valley of the North, has a historical value and a romantic interest which well bears comparison with often repeated tales of the lumber camps, the cow country and the sea. It is a story which has progressed so rapidly that men who have reaped their grain with the cradle-scythe can now watch the self-propelled combine cover the same fields.

For a decade during the 1920's and 1930's the writer served as a laborer in the harvest fields of the Valley and experienced a phase of the history with which this study deals. Accordingly, when after considerable research, the writer found that much remained to be written on the subject of farm mechanization, he determined to conduct a study in that field. This thesis is an attempt to contribute to the knowledge of this interesting part of history, and to capture something of the romance which accompanied the swift mechanization of the Red River Valley of the North.

A.B.J.

TABLE OF CONTENTS

FARM MECHANIZATION IN THE RED RIVER VALLEY, 1870-1915

CHAPTER I

EARLY EVOLUTION OF FARM MACHINERY

The use of farm machinery dates back to the earliest times. Isaiah, XXVIII, 27-28 states: "for the fitches are not threshed with a threshing instrument, neither is a cartwheel turned about upon the cumin; but the fitches are beaten with a staff and the cummin with a rod." Fitches are peas and cummin is something like carroway. At a later period Isaiah (41:15) mentions "a new sharp threshing instrument having teeth," while Amos (Amos 1:3) tells us of "threshing instruments of iron."

The earliest instruments used in agriculture were the crooked stick for plowing, the sickle for cutting grass or grain, the club or flail for threshing, crude wooden hoes and shovels for tillage and a sack or fold of cloth for sowing.

THE PLOW

The use of the plow was probably concurrent with the beginning of agriculture itself. Illustrations of early plows show that they were "made wholly of the natural crooks of the branch of a tree. The only artificial contrivances were the brace which strengthened the share and the pins in the forepart of the beam, which served as a hitch."[1]

The old Roman plow, as described by Virgil had a point consisting of two pieces of wood meeting at an acute angle and plated with iron.[2]

---

1. Lillian Church, History of the Plow, Information series 48 (revised October, 1935) United States Department of Agriculture, Government Printing Office, Washington, D.C., 1.
2. Ibid.

In England a plow known as the Rotherham plow was in use by 1750. A Scotchman, James Small is credited with making various improvements on this type. It was made of wood, except for an iron point and an iron coulter and share. George Washington, according to the United States Census for 1860 is recorded as having imported a plow of this sort.[3]

The invention of the first iron plow took place sometime in the late 1700's in Scotland or England. Its first reception according to some reports was anything but favorable. Many farmers believed that it poisoned the soil and made weeds grow faster.[4]

The early American colonists brought the plow across with them from Europe. However, according to reliable investigators, the Pilgrims had none for the first twelve years, while in 1636 there were only thirty plows in the entire Massachusetts Bay Colony.[5]

The Dutch settlers of Delaware, according to the same source, were better provided with farming tools. From a list of supplies sent in 1662 we read that twelve plowshares with coulters, a first class wheel plow with pulley, thirty hoes and various other tools were included.[6]

By the early 1800's the plow was in general use in America. "The development of the plow took two directions: (1) the improvement in design or form, and (2) the substitution of iron at first and later steel for wood in the moleboard, share, and landslide."

---

3. Lillian Church, History of the Plow, 2.
4. Ibid., 3.
5. Percy Wells Bidwell and John I. Falconer, History of Agriculture in the Northern United States 1620-1860, Peter Smith, New York, 1941, 35-36. This edition is reprinted with the permission of the Carnegie Institution of Washington by Peter Smith, New York, 1941.
6. Ibid.

Thomas Jefferson is credited with developing the first plow on mathematical principles as to form and shape.[7] In 1797, Charles Newbold made a cast-iron plow with moldboard, share, and landslide all in one casting. In 1814 and 1819 Jethro Wood took out patents for plows with moldboard, share, and landslide cast separately and fastened together with lugs and bolts. This was an important development because it enabled farmers to replace the part worn out by cast pieces.[8] Moreover he could do this in the field.

When the American pioneering farmer pushed across the Appalachian barrier, he found himself in one of the most fertile farming regions of the world. The rich prairie country in many cases needed only to be turned over by the plow. The pioneer turned the sod with his cast iron plowshare, seeded, grew, and harvested his crops. Then he struck a snag. The second plowing proved difficult because the cast iron plow, which had served well enough in the lighter soils of the Atlantic coastal plain, would not scour in the rich loam soils of Ohio, Indiana, and Illinois.

> For breaking the prairie sod, the most satisfactory plow in 1840 was an immense affair with a wooden moldboard and iron share. The moldboard was usually covered with strips of iron to lessen the friction as much as possible. Two small wheels connected by a short axle and frequently made from a piece of plank supported the front end of the beam and governed the width as well as the depth of the furrow. From five to six yoke of good oxen were required to operate a plow of this kind with only a single man or boy to drive.[9]

The plowshare weighed about 125 pounds, the beam was some fourteen

---

7. Bidwell and Falconer, 208.
8. Ibid., 209.
9. Ibid., 283.

feet in length, and the furrow plowed from eighteen to twenty-six inches in width.[10]

The lack of a good plow, one that would scour clearly, and not require excessive power to operate, seemed likely to halt the westward migration outright. Necessity, however, is often the mother of invention. The American facility for invention engendered by pioneering conditions was already at work on the problem.

William H. Kircher gives an extremely interesting account of the man who solved the problem.[11] In 1834, a Major Leonard Andrus moved from Vermont to Grand Detour along the Rock River in Illinois. Not only was Andrus an enterprising farmer on his own account but was also interested in inducing other settlers to move into the community.

However, he and his neighbors ran into the same difficulty--the second plowing of the soil. Their plows would not scour cleanly. A man was obliged to carry a wooden paddle along and continually scrape sticky soil from his plowshare. Among Andrus' former Vermont neighbors was one John Deere,[12] who had won a reputation as an excellent blacksmith and was noted as a producer of fine tools. Andrus induced Deere to join him in the Rock River country. Deere, soon after his arrival in the neighborhood, began to put his mind to the problem at hand.

Andrus and Deere, or perhaps Deere alone made a moldboard of hard wood and Deere faced it with steel from an old saw blade. The

---

10. Bidwell and Falconer, 283.
11. William H. Kircher, "Breaking the Good Earth," The Farmer, St. Paul, Minnesota, April 2, 1949, 21 and 39.
12. Ibid., 21.

steel would scour but Deere still had to correct the curve in the moldboard. After many experiments he succeeded. The plow worked! Deere tried it out on the farm of one Lewis Crandall, a farm which contained the stickiest gumbo in the neighborhood, and it scoured perfectly.

Deere and Andrus formed the Grand Detour Plow Company, which by 1846 was turning out 1000 plows annually. In 1847, however, Deere dissolved his partnership with Andrus and moved to Moline, Illinois. Here, in 1868, his own company was incorporated as Deere and Company. He continued as president of this organization until his death in 1886.[13] He was succeeded by his son, Charles Henry Deere. The younger Deere became president of Deere and Company and also president of the John Deere Plow Works, and of Deere and Mansur Company, manufacturers of cotton and corn planters.[14]

In 1884, August Lindgrem produced the sulky plow. This machine had two furrow wheels, a stubble wheel, and a seat on which a man could ride. From the sulky plow was developed the gang and multiple bottom plows.[15]

With the settling of the dry farming area of the West, the disk plow was invented. This machine gave a maximum stirring of the soil but left the stubble upright to prevent drifting of the soil.[16]

---

13. Encyclopedia Brittanica, New York, Encyclopedia Brittanica Inc., 1946, "Deere, John," Vol., 7, 136.
14. Who was Who in America, Chicago, United States America, 1943, A. N. Marquis Company, 310.
15. William H. Kircher, The Farmer, April 2, 1949, "Breaking the Good Earth," 39.
16. Benjamin Butterworth, The Growth of Industrial Art, 1892, Washington, D.C., 3, as quoted by Lillian Church, History of Cultivators. Information series No. 52 (Revised August, 1935) Washington, D.C., Government Printing Office.

THE CULTIVATOR

The cultivator, like the plow, was developed from a naturally curved branch of a tree. The plow was used to prepare the soil before seeding, while the cultivator was employed to destroy weeds and to conserve moisture by stirring the soil. The planting of row crops made cultivators especially necessary. Because of the difference in purpose the two machines developed differently. However, the plow and also the hand hoe were long used as cultivators. The plow, however required excessive power for this purpose, while the use of the hand hoe meant slow and laborious work.

We do not know who actually invented the first cultivator, although certainly the first machines were not patented. According to Butterworth,[17] one Wilkie of Scotland is the inventor. His machine of 1820 possessed plurality of shares, the expanding frame and the castor wheel. Another source[18] credits Jethro Tull, the celebrated English farmer, with the invention.

Lillian Church[19] in History of Cultivators gives an interesting extract from the Complete Farmer published in London in 1807. "The horse-hoe is a very powerful tool of the hoe kind, which is very much employed in the cultivation of crops that are sown or planted in the drill or hoe method with sufficiently large intervals."

Thus the cultivator, like most farm tools, was invented in Europe rather than in America. The Americans must be credited with improving the implement, however, and adapting it to their special uses. During our early history, it is true, the hoe was the main

---

17. Benjamin Butterworth, The Growth of Industrial Art, 3.
18. United States Commissioner of Agriculture Report, 1870, 397-398, as quoted by Lillian Church, History of Cultivators, 2.
19. Church, History of Cultivators, 2.

tool of cultivation. When the eastern mountain barrier was passed and the farmers began the cultivation of vast fields of corn, a better type of cultivator became essential, and the development of this type of machine received a great stimulus. The extensive cultivation of the potato in America added to the need for this type of machinery.

In colonial days, while cultivation was accomplished for the most part with hoe or plow, a harrow was sometimes used for cultivating between the rows of Indian corn.[20] In the early part of the eighteenth century a heavy three-cornered harrow was employed. The traces were fastened to it with a link for convenience in turning. This machine was pulled between the rows by a team of horses with a boy riding on the back of one of them.

The first United States patent for a cultivator was issued to a Mr. Borden in 1830, and the first wheel cultivator patent was issued in 1846.[21]

The cultivator had largely supplanted the plow and hand hoe on eastern farms for working between the rows by 1840.[22] The cultivators used, while heavy and clumsy by modern standards, cost only from $15 to $20 each. Even these early machines could till more land in a given time than three plows.[23]

By 1860, great improvements had been made in cultivators. Three-shovel plows and steel-tooth cultivators had come into use. Straddle-row cultivators of various types also made their appearance.[24]

---

20. Bidwell and Falconer, 124.
21. Lillian Church, History of Cultivators, 5.
22. Ibid., 210.
23. Ibid., 211.
24. Ibid., 211-212.

A great improvement in work and a great saving in labor had been affected.

SEED DRILLS AND CORN PLANTERS

While very ancient peoples, including the Chinese, are supposed to have invented machines for planting seeds, the reports do not appear to be well authenticated. The usual manner until quite recent times was broadcasting by hand.

Jethro Tull, the English farmer-inventor, whose name is associated with so many types of farm machinery, is credited with an early successful drill.[25] Drills were apparently in use in Scotland by 1765.[26] As early as November 27, 1623, the first English patent for a seeding machine was granted to one Alexander Hamilton, while the first United States patent on grain drills was issued to E. Spooner, January 25, 1799.[27]

The introduction of seeding machinery for general use was slow. "In 1840, wheat was sown broadcast by hand and harrowed in with a harrow or steel-tooth cultivator, but by the middle of the decade drills were coming into use, and by 1850 they were rather generally used in the wheat regions of Pennsylvania and New York."[28]

"One drill of this period, the Pennock drill proved fairly satisfactory. This machine used by 1847 sowed 7 rows 9 inches apart and about 3 inches deep, the outside drills being about 4 feet 6 inches apart. The machine was drawn by two horses and planted from 10 to 15 acres a day."[29]

---

25. Lillian Church, History of Grain Drills, Information series No. 70, Washington, D.C., Government Printing Office, 1935, 3.
26. Ibid., 3.
27. Ibid., 3 and 4.
28. Bidwell and Falconer, 299.
29. Ibid., 299-300.

Indian corn, unlike the smaller grains, is a native American crop, and it is natural that the corn planter should have been developed in this country. The vast fields of the southern border of the Midwest made such a machine essential and it was in that section that the first really practical corn planters were employed. Nevertheless, until about 1840 the corn crop was for the most part planted by hand with the aid of a hoe for digging holes and covering the seed.[30]

A great many patents were issued for corn planters. Among the early types were the Cole planter, the Randall and Jones planter, and Brown's corn planter.[31] The Cole's corn planter was a rather clumsy affair of the wheelbarrow type. Billing's improved corn planter and fertilizer dropped seed and fertilizer and covered the seed at one operation. A man with one horse could plant from 6 to 10 acres a day.[32] Randall and Jones corn planter was a two-row hand planter which a man could operate about as fast as he could walk.[33] Brown's corn-planter was a two-row, two-horse machine which required a driver and another man to work the levers. It would plant from 12 to 20 acres a day and was in use by 1860.[34]

"George M. Brown of Galesburg, Illinois, devoted much of his time to the development of the corn planter and secured patents on many features. To Brown's efforts we may credit the shoe furrow opener, the rotary drop, and a method of operating the drop by hand."[35]

---

30. Bidwell and Falconer, 300-301.
31. Ibid.
32. Ibid., 300.
33. Ibid., 301.
34. Ibid.
35. J. Brownlee Davidson and Leon Wilson Chase, Farm Machinery and Farm Motors, Orange Judd Company, New York, 1908, 120.

Brown had patents issued in 1853, 1858, and in 1860.[36]

A patent on a marker was granted to E. McCormick in 1885.[37] In 1892, the Dooley brothers of Moline, Illinois, brought out the edge selection drop.[38] The check rower was a practical device which was introduced in 1876.[39]

GRAIN HARVESTING

Of all farm implements none is of greater interest than the reaper. Except for the plow, no farm implement has been of greater influence in the history of mankind, and no machine has had a more marked effect in modern progress.

Man's first harvesting tools were his hands. Sometime in antiquity he developed a curved knife, the sickle. When he placed a longer handle on his knife and somewhat altered its shape it became a scythe. A few steps back in history he developed the cradle. Then, yesterday, scheming man produced the reaper, the binder, the harvester-thresher. He brought out the machine to harvest the sheaves from his vast fields that the teeming population of our great cities might have bread.

There seems to be no doubt that the process of reaping began before recorded history. The most reliable sources indicate that sickles were used by the ancient Egyptians, Chinese, and Japanese. The same sources credit the Romans with considerable development of both scythe and sickle. After Romans times, however, little progress in development of reaping machinery or tools seems to have

---

36. Lillian Church, History of Corn Planters, United States Department of Agriculture, Government Printing Office, 6.
37. Davidson and Chase, Farm Machinery and Farm Motors, 120.
38. Ibid., 120.
39. Ibid., 121.

bean made until quite recent times. Until about a hundred years ago, the scythe and sickle were still the standard tools for harvesting grain.[40]

In 1794, a Scotsman invented what was described as a most wonderful machine for cutting grain, doing as much in a day as seven men could do with a sickle. This marvelous machine was only the cradle. The cradle or cradle-scythe consisted of the scythe itself and several flat curved rods attached parellel to the blade of the scythe.[41] We do not know who this benefactor of mankind was, but at the time his contribution was at least mildly revolutionary. With the cradle scythe a man could cut grain about as fast as with a cradle-less scythe, but he could lay the grain in rows, which greatly facilitated picking up and binding it.

While there were a number of early attempts to construct reapers, the first successful machine appears to have been invented by a Mr. Gladstone in England in 1806.[42] In this machine the horse walked to the side of the grain; hence the introduction of the side cut. It had a revolving cutter and a crude sort of guard. It did introduce an inside and an outside divider. In 1808 a Mr. Woburn of England invented the reciprocating cutter, which acted over a row of stationary blades, while in 1822, Henry Ogle of Remington, England, produced the first reel.[43] Patrick Bell, an English minister introduced

---

40. Lillian Church, Partial History of Grain Harvesting Equipment, Information series No. 72, Department of Agriculture, Washington, D.C., Government Printinf Office, 3.

41. G. K. Holmes, Progress of Agriculture in the United States, United States Department of Agriculture Yearbook, 1899, 307-334.

42. Davidson and Chase, Farm Machinery and Farm Motors, 138.

43. Ibid., 139.

a canvass moving on rollers to carry off the grain.[44]

While the early years of the nineteenth century saw some American attempts to invent or improve reapers, little was accomplished until the machines of Obed Hussy and Cyrus Hall McCormick appeared. Both men were working on machines at the same time. Hussy secured his first patent in 1833, and McCormick received his in 1834.[45]

"Hussy's first machine was a very crude affair. It consisted of a frame carrying the gearing, with a wheel at each side and a platform at the rear. The cutter was attached to a pittman, which received the motion from a crank geared to the main axle. The cutter worked in a series of fingers or guards."[46]

The most famous of all the many men who struggled to develop the reaper was Cyrus Hall McCormick. The McCormicks were of Scotch-Irish stock. The first McCormick to come to America was one Thomas McCormick who arrived in the United States from Ulster in 1794. The family settled first in Pennsylvania, but later moved to Virginia.[47] Thomas McCormick's great-grandson, Cyrus Hall McCormick was born February 15, 1809, on the family farm, Walnut Grove, in Rockbridge County, Virginia.[48]

Robert McCormick, the father of the inventor, made several attempts to produce a reaping machine but failed to construct a successful one. He did interest his son however, who took up the task.[49]

---

44. Davidson and Chase, Farm Machinery and Farm Motors, 138.
45. Ibid., 139.
46. Ibid., 140.
47. Cyrus McCormick, The Century of the Reaper, Houghton Mifflin Company, Boston and New York, 1931, 6.
48. Ibid., 7.
49. Ibid., 8.

In 1831, a successful trial of a reaper was made by young McCormick and his negro helper Joe Anderson. While this machine worked, it was far from perfect and McCormick continued to develop it. In 1834, spurred by Hussey's patent of the year before, he secured one of his own. It was at this point that the bitter rivalry between Hussey and McCormick had its beginning.[50]

Cyrus Hall McCormick's reaper of 1831, imperfect as it was, contained the seven essential principles which are employed in all grain cutting machinery today.[51]

(1) The straight reciprocating knife, whereby the standing grain is attached by lateral motion, as well as by the forward motion of the machine.

(2) The fingers or guards to support the grain at the moment of cutting.

(3) The reel, which gathers the grain in front of the reaper.

(4) The platform on which the grain falls.

(5) The main wheel, from which the power is obtained.

(6) The principle of cutting to one side of the line of draft.

(7) The divider at the outer end of the cutting bar.

Between 1831 and 1842, McCormick reapers were built only in the little log forge shop on Walnut Grove Farm.[52]

At the end of the 1842 season, McCormick announced that he intended to introduce his machine in different parts of the country and to establish agencies for the manufacture and sale of them at

---

50. Cyrus McCormick, The Century of the Reaper, 8-16.
51. Ibid., 17-18.
See also: William T. Hutchinson, Cyrus Hall, McCormick, the Century Company, New York and London, (2 Vols.) 1930, I, 74-98.
52. International Harvester Company, McCormick Reader Centennial Source Material, Chicago 1931, 28.

various locations.[53] In accordance with this plan he decided to investigate other sections of the country, expecially the West. In 1844, he sold reapers in New York, Tennessee, Ohio, Illinois, Wisconsin, and Missouri, as well as in his own locality.[54] He sold a manufacturing license about this time to the Seymour and Morgan Company of Brockport, New York, and also established his brother, Leander, in Cincinnati. Eventually McCormick Reapers were manufactured and sold at many points in the East and Midwest.

In 1847, McCormick decided to move to the new western town of Chicago in the Middle West.[55] There he formed a partnership with a Mr. Gray of the firm of Gray and Warner, manufacturers of cradle-scythes. Gray and McCormick built five hundred machines for the harvest of 1848. The partnership dissolved, however, when Gray and McCormick quarreled. Gray sold out to William B. Ogden, and a new company, McCormick, Ogden, and Company was formed October 17, 1848.[56] Ogden in turn withdrew from the organization in 1849, and sold out to McCormick.

McCormick had by 1850 laid the foundations for his career as a great industrualist, and the story of his rise is a romance in itself. In 1851 he sold 1,004 machines, in 1855, 2,534, and in 1861, 6,000.[57] He was not only an inventor and a manufacturer, but a great organizer as well. He died May 13, 1884 but the mighty

---

53. Hutchinson, Cyrus Hall McCormick, I, 187.
54. International Harvester Company, McCormick Reader Centennial Source Material, 5.
55. Hutchinson, Gyrus Hall McCormick, I, 251.
56. Ibid., 265.
57. International Harvester Company, McCormick Reaper Centennial Source Material, 11-12.

business organization which he had founded continued to grow. The American Harvester Company,[58] a consolidation mainly of McCormick and Deering interests was formed in 1890, but died for lack of financing in 1891.[59] Finally in 1902, the great International Harvester Company,[60] a union of the Deering, McCormick, Plano, and Milwaukee Companies, was formed. This merger was a resulting compromise of an industrial war in which the McCormick and Deering factions were prominent.

From 1850 on, improvements in grain cutting machines made rapid progress. In 1851, Palmer and Williams were granted a patent for a sweep rake attachment which swept the platform at regular intervals and left the grain in bunches to be bound.[61] A really revolutionary change occurred in 1858 when C. W. and W. W. Marsh produced the Marsh Harvester. This consisted of a moving canvass which elevated the cut grain over the drive wheel. Here it was deposited on a binding platform, where two men stood and bound the grain by hand.[62] In the early seventies the wire-binder was produced by Sylvanus D. Locke, by the Gorden brothers of Rochester, New York, and by Charles B. Wethinton of Janesville, Illinois.[63]

The wire-binder eliminated the need of hand-binding and saved the labor of at least two men. Its day however was brief. In 1875, John F. Appleby of De Pere, Wisconsin produced a successful twine binder and knotter.[64] Appleby became a partner of William Deering.

---

58. Cyrus McCormick, The Century of the Reaper, 107.
59. Ibid., 108-109.
60. Ibid., 111-127.
61. Davidson and Chase, Farm Machinery and Farm Motors, 141.
62. McCormick, 31.
63. Ibid., 32.
64. International Harvester Company, McCormick Reaper Source Material, 32.

and the two, in 1880, produced 3000 twine binders.[65] The McCormick, Champion, and Osborne companies all secured rights to this improvement.[66]

Since the early 1880's, the binder has undergone no fundadamental change. The McCormick frame and cutting mechanism, the Marsh Harvester, and the Appleby binder and knotter comprise the basic principles of any binder in use today.

THE GRAIN THRESHER

The first instrument for grain threshing was the flail. In ancient times it was a whip with two or more lashes. The "modern" flail consists of a handle or handstaff, which the laborer holds in his hand, and uses as a lever to raise up and bring down the swiple, or part which strikes the grain, in order to separate seed and chaff. The swiple is joined to the staff by the caplins or couplings, which are thongs of leather. These thongs are passed through holes in the ends of the handle and swiple and made fast by being sewed together.[67]

Another method of threshing originating in very early times was to drive horses or cattle over sheaves of grain laid out on the hard ground or threshing floor. In the Bible it is recorded that "thou shalt not muzzle the ox when he treadeth out the corn."[68]

These then were the methods employed by man to thresh the crop which he reaped. They were in use throughout the world over the centuries until quite recent times. Indeed, they are still employed

---

65. Lillian Church, Partial History of Grain Harvesting Equipment, United States Department of Agriculture, Government Printing Office, Revised 1947, 42.

66. International Harvester Company, McCormick Reaper Centennial Source Material, 32.

67. Church, Partial History of the Development of Grain Threshing Implements and Machines, United States Department of Agriculture, Government Printing Office, Washington, D.C., 1939, 3.

68. Deuteronomy 4:25.

in many backward regions today.

When man turned to mechanical means to harvest crops, his inventions took several forms.

After much experimentation, he developed such instruments as reapers, mowers, binders and combines. It was a long process in which hundreds of men participated.

In modern times the English and Scotch made numerous attempts to develop machines for threshing. The celebrated Jethro Tull, inventor of the drill-plow, and horse-hoe cultivator is said to have projected the first modern threshing machine. His attempts, while apparently not very successful, evidently inspired later efforts.

About the year 1750, a Scotchman, Michael Menzies, devised a machine of the flail type operated by water power.[69] In 1758, a Mr. Lechie of Stirlingshire, England produced a thresher with arms attached to a shaft and enclosed in a case.[70] Still another early machine was that of Atkinson of Yorkshire, which had a cylinder with teeth, or as it was called a peg drum. These teeth ran across other rows of teeth which acted as concaves.[71] None of these early machines were particularly successful, although there seems no doubt that later inventors obtained ideas from many of the early types.

In America, as in England and Scotland, a great many men worked on the problem of developing a machine for threshing. We should

---

69. Davidson and Chase, Farm Machinery and Farm Motors, 204.
70. Ibid.
71. Ibid.

realize that no one man developed this invention overnight. A large number of men tried, and failed, and tried again. We can only give credit to those men whose inventions proved practical.

In America, the Pitt brothers, of Winthrop, Maine, figured more prominently than most others in the development of a really practical grain thresher. These brothers, Hiram A., and John A. Pitts, received a patent on December 29, 1837, on a thresher of the "endless apron" type, the first of its kind.[72] The first machines turned out by the Pitts brothers were successful. John A. Pitts located at Buffalo, New York, where he manufactured the Buffalo Pitts machine, while Hiram A. Pitts turned out the Chicago Pitts in Chicago, Illinois. John A. Pitts died in 1859, and his brother in 1860. These men should receive much credit for their efforts in producing a practical machine.[73]

The early machines were horse-powered. Two types were produced; the treadmill and the sweep. The sweep required sometimes as many as five or six teams for operating power. The early horse power machines had a vertical shaft mounted between beams to which one or more long arms or sweeps were attached. The power was taken by a tumbling rod from a master wheel mounted above.[74] The entire apparatus could be mounted in a wagon and hauled from place to place. At each new place it was again set up. A thresher of this type was known as a groundhog thresher. Besides the sweep and the treadmill, water power threshers were sometimes employed.[75] The Pitt

---

72. Davidson and Chase, Farm Machinery and Farm Motors, 205.
73. Ibid., 206.
74. Ibid.,
75. Ibid., 205-206.

machine of 1860 with the horse-power included sold for $200 and had a capacity of 100 bushels of wheat per day, whereas a man with a flail might possibly thresh five or six bushels.[76]

Before the Pitt brothers developed their thresher, much threshing was done by a flail, although a few small threshers were in operation. The cleaning was accomplished in a fan-mill turned by hand. The Pitts conceived the idea of combining thresher and fanning-mill.[77] "The Pitt machine of 1840 weighed about 700 pounds, was about 8 feet by 2 feet 4 inches in size and was driven by 6 or 8 horses on a sweep. It threshed from 20 to 25 bushels of wheat per hour."[78] By 1860 wheat in grain-growing regions was nearly all threshed by portable machines, which threshed and separated the grain.[79]

The self-feeder and band-cutter came into general use during the middle 1890's and the blower or wind-stacker in the early 1900's. By 1912 the threshing machine had acquired practically all the characteristics in use today. Details have been improved but no essential principle has been added.[80]

Among the many men who worked with threshing machines, one of the most interesting was Jerome Increase Case of Racine, Wisconsin. Case was born in Williamstown, Oswego County, New York in December 11, 1818. He came of pioneer farming stock and as a boy did the

---

76. Bidwell and Falconer, History of Agriculture in the Northern United States, 216.
77. Ibid., 298.
78. Ibid., 299.
79. Ibid., 299.
80. Church, Partial History of the Development of Grain Threshing Implements and Machines, 22-30.

usual laborious chores required on a farm.[81]

When Case was sixteen years old, his father placed him in charge of a horse-power treadmill threshing machine which he operated for five seasons.[82] He attended Mexico, New York Academy, and, after completing his course, decided to move West. He purchased twelve threshing machines and sold six of them in Racine, Wisconsin. He established a business in Racine, and in 1844 designed, built, and put into operation a combined thresher and separator. By 1857 his plant had grown to such an extent that he was able to produce some 1,600 machines yearly. In 1863 he formed the J. I. Case Company, and in 1880, this company was incorporated as the J. I. Case Threshing Machine Company.[83]

Case was to the thresher very much what McCormick was to the reaper. In the life of the two men we see many points for comparison. McCormick invented only one of the principles of the reaper (that of the main wheel). Certainly Case also based his developments in threshers on the work of many other men.

Yet both were farm raised, both were capable mechanics, and practical demonstrators of their machine. Both were capable business men and able oragnizers. Each developed immense organizations which long outlived them. Together with John Deere, the inventor of the self-scouring plow, the products of their organizations have dominated American agricultural machinery for the last three quarters of a century.

---

81. Carl W. Mittman, "Jerome Increase Case," Dictionary of American Biography, New York, Charles Scribner's Sons, 1929, III, 556-557.
82. Ibid., 557.
83. Ibid.

According to one source,[84] Case also gave the steam engine to agriculture in 1869. The first engines were crude and had to be pulled from place to place by horses, but they were steady and reliable for belt work. Soon afterwards self-propelled engines were developed which were capable of hard, heavy drawbar work such as plowing and road work.

In 1869, the Case Company produced the Raymond Gas Engine of one, two or four cylinders.[85] The company continued to produce both engines and separators. The famous Case Agitator separator of the early 1890's displayed a high grain elevator and a swinging stacker but was still minus a blower.[86]

A few years later, in 1897, this same machine displayed a windstacker to replace the old web-stacker type, and the windstacker (Nethery's Farmer's Friend) soon came into common use. This machine had practically all the adjustments of today's windstackers.[87] In 1904, the Case Company brought out the first all steel separator.[88] Even with these improvements, however, old types of threshers did not pass out of use. The Case catalog of 1904 lists horse-power sweeps, sprocket-chain stackers, and stacker-carriers.[89]

The Case catalog of 1904 also listed separators of both carrier-[90]

---

84. J. I. Case Company, Case Wood Engravings, Reminder of a Lost Art, St. Paul, 1942, 4.
85. Ibid., 8.
86. Ibid., 12.
87. Ibid., 12-14.
88. Church, Partial History of the Development of Grain Threshing Implements and Machinery, 20.
89. J. I. Case Threshing Machine Company, The Case Catalog, Racine, Wisconsin, 1904, 51-58.
90. Ibid., 40-55.

stacker and wind-stacker types. It listed machines with and without self-feeders and band-cutters. Among the types offered were the Agitator, the Belt, the Wind-stacker, the Case low-deck windstacker, and the Case Combined Thresher.

From the above discussion, it may be seen that while practically all principles of the modern threshing machine had been developed by 1900, their use was probably not universal until some years later.

Ever since Adam was told that he must earn his bread by the sweat of his brow, his scattered children have been busy trying to do this less with the former and more with the cells which lie behind the latter. So it has been with the evolution of farm machinery. Jethro Tull, Thomas Jefferson, Cyrus Hall McCormick, John Deere, and J. I. Case were all practical, working, thinking farmers. None of them were original in their inventions. None were top scientists. Yet these are the great names of Agricultural Mechanization. They are great because they gave the farmer the machine so that he could produce food. With the machine the farmer did produce food, millions of tons of food. He produced it in such quantities as the world had not known through all the weary centuries of drudgery of man and beast. Down through the ages, the cursing sweating toil of his own long days, the yoked agony of his straining brutes had been employed that he and his brother of the city caves might eat. This, then, the mastery of the machine by man that he might better earn his bread, is the romance of the plowlands, the pageant of the harvest, the evolution of Agricultural Machinery.

CHAPTER II

TILLAGE AND SEEDING MACHINERY IN USE IN THE RED RIVER VALLEY

Among the most celebrated farming regions of the world is the famed Red River Valley of the North. The Red River owes its source to the junction of the Bois De Sioux River, running north out of Lake Traverse, and the Otter Tail River, from west central Minnesota. These two streams join at the spot where the present cities of Wapeton and Breckinridge are now located. From this point the Red River runs north between the states of Minnesota and North Dakota, crosses into Canada at St. Vincent and Pembina, is joined by its western tributary, the Assinniboine, at the city of Winnipeg, and pours its waters into Lake Winnipeg at the town of Selkirk.

The plain of the Red River is remarkable for its fertility. This valley, a product of the last great ice age, is ideal for the raising of hard northern wheat, although it can and does produce a variety of other important crops as well. Notable among these are sugar beets, potatoes, fodder corn, and flax.

About a hundred thousand years ago the last great continental glaciers began to take shape.[1] The great Keewatin ice sheet formed in north central Canada and crunched its way southward. As it moved over Minnesota and the Dakotas, it blocked the northward flowing Red River and created a vast lake. This body of water was the prehistoric Lake Agassiz. For some 60,000 years the enormous ice mass grew and thickened. Then slowly it melted and retreated

---

1. Paul O. McGrew, "Lake Agassiz," The World Book, Chicago, Quarrie Corporation, 1946, IX, 3618-3619.

to its northern source.

Once more the Red River altered its course, leaving the gorge of the Minnesota River and emptying its flood into the northern sea. The immense Lake Agassiz drained and left a rich deposit of lake bottom soil for ten to twenty or more miles on each side of the river.[2] Trees sprang up along the water courses, and the prairies were covered with lush grass. For centuries this valley was the home of the Indian and the wild beasts which he hunted.

Then, finally came the white man, bringing with him the bread culture and the tools of the soil. The Indian vanished, the buffalo disappeared, and the half-breed trapper turned farmer or left for a last stand on the course of the Assinniboine.

When Cyrus Hall McCormick had developed his reaper, he found the east too small a market for his talents. It was not until the flood of settlement had poured through the passes of the Appalachians that John Deere developed his steel plow. It was no accident that the Pitts brought out a "Chicago Pitts" as well as a "Buffalo Pitts," thresher. Jerome Increase Case moved west to Racine, leaving the limited field of his New York boyhood. Westward over the plains of the Great Lakes went the ever restless migrants of the farmlands. Moving always to the new lands of the West and North, the settlers spilled over into Iowa, Wisconsin, and Minnesota. Inevitably these land hungry farmers found and entered the Red River Valley of the North.

Here was a land of fertile soil and wide stretches of cleared land. Wonderfully free of rocks, brush, and tree stumps, it needed

---

2. McGrew, IX, 3619.

only to be plowed, acratched with a harrow, and sowed to the master crop, wheat. Into this valley in the 1870's and 1880's moved the migrants from the eastern states. In short order, too, they were joined there by armies of home seekers from Scandinavia, Germany, and the other worn lands of northwest Europe.

So the people came, and with them they brought machines. Machinery this country must have and machinery fit for the bigness of it. A man could not tolerate a walking plow for his two mile furrows, nor could the solid sections of the Dalrymple holdings be cut with the cradle-scythe. The Valley was an area well suited to use the best achievements of Case, the Pitt brothers, McCormick, Deering, Appleby, and Deere. Down through the decades, then, was to pass a mighty parade of reaper, binder, thresher, tractor, and combine. The machines were to form a far reaching pageant, which was to be the stirring story of the Red River Valley of the North.

The first tools which the farmers brought to the Valley were crude and were not sufficient. The broad fields of the Red were too generous, and its rich soil too bountiful. The simple iron plow, the sickle, the cradle-scythe, the horse-power thresher were puny tools for this rich land. They gave way to the gang plow, the binder and the steam thresher. The horizon passing farms of the bonanza period sprang up, dwarfing the tiny homesteads of the east.

The tools of agriculture, however, were not developed in the Red River Valley. This had been for the most part accomplished in the older regions of the East. Tull and Jefferson were already long dead, while the great McCormick was in the last years of his amazing career.

The Valley was a lusty infant, using first the simpler tools, but soon tossing them aside in disgust as his strength increased. Like a stout child, too, when the Valley saw a thing which it wanted, it reached out and grasped that thing and took it for its own. The mechanization of farming was not a development occurring in the Red River Valley alone, yet, here was reenacted, in the short space of a generation, the patient progress of centuries. Nowhere can we find a better picture, a truer portrayal of the evolution of farm machinery.

The first farmers in the Valley were the Selkirk settlers whom Thomas, Earl of Selkirk brought from the Scotch estate of the Duchess of Sutherland in 1811. For the first few years these people were too busy defending themselves against the attacks of the hostile Indians and half-breeds of the Northwest and X. Y. fur companies to do much farming.[3] The adherents of the big fur outfits were trappers and buffalo hunters and were afraid that the farmers would drive away all the game animals. It was not until 1817 that Lord Selkirk was able to establish reasonable security and provide his settlers with some crude farming implements. Locusts destroyed the crops in 1817, 1818, and 1819, but at last, in 1820, the first wheat crop in the Red River Valley was harvested near what is now Pembina, North Dakota.[4]

The farming implements of the Selkirk settlers were of quite

---

3. Hon. George N. Lamphere, "History of Wheat Raising in the Red River Valley," Minnesota Historical Society Collections, Minnesota Historical Society, St. Paul, 1905, X, 2.
4. Ibid., 4.

primitive types. The plow, of Scotch or English make, was made of iron from the tip of the beam to the extreme end of the handle. It was some ten or twelve feet long and was pulled by one horse.[5]

For some fifty years the Selkirk settlement constituted an oasis of farming in a wilderness of trappers and buffaloes. A few scattered settlers made their appearance during the 1850's and 1860's, but it was not until the 1870's that the great American influx of settlement began. During the greater part of this period little or no wheat was raised south of the international boundary line.[6] The early American settlers lived on fish, game, garden vegetables, and some flour imported from the Selkirk settlement.[7]

In the early seventies the tillage implements of the farmers were quite crude.[8] Mr. Knute Nygard, a pioneer farmer of Mekinok, North Dakota, which is situated in the valley to the northwest of Grand Forks, arrived in that vicinity with his father in 1876. He states that they used a fourteen inch steel plow pulled by two or three horses. They made a homemade harrow, known as a drag, by nailing thornapple brush to a stout pole. They broadcasted their first crop of wheat by hand. A man used a bucket tied with a rope about his shoulders and neck. This bucket hung down in front, and the sower broadcasted seed with both hands. The following year the Nygards made a harrow by driving wooden pegs through holes bored in a framework of poles.

---

5. Lamphere, 4.
6. Ibid., 11.
7. Ibid.
8. Interview with Mr. Knute Nygard, 622, Walnut Street, Grand Forks, North Dakota, June 27, 1949.

Mr. N. N. Nelson,[9] another pioneer, who arrived in Blooming Township, North Dakota, fourteen miles west of Grand Forks, as a boy, tells of using a sixteen inch Monitor breaking plow in 1779. It required three horses for power. However the Nelson family had the misfortune to lose one horse, and was obliged to substitute an ox in its place. About the same time, also, Mr. Nelson tells of an ox-harrow, made of two sections of round oak pieces. Holes were bored in these pieces for pegs. The whole affair was hinged together with loop irons. On the same farm an oak log was used as a soil packer. That is, it was dragged over the fields, after seeding, to compress the soil and conserve moisture. After a few years, probably in the early 1880's, the Nelsons obtained a broadcast seeder with which they sowed their small grain.

Some broadcast seeders of this period were mounted on a wooden frame. They were two-wheeled machines and were pulled by a team of horses or oxen. They were about eight feet wide and could broadcast all sorts of grain.[10] Another type was mounted on the back of a wagon. The mechanism of the seeder was attached by a chain drive to a large gear on the inside of one of the back wagon wheels. The Stowbridge Broadcast Seedsower was a seeder of the latter type. This machine was manufactured by the Racine seeder company of Des Moines, Iowa. It was used in the Valley during the middle 1880's, as was evidenced by advertisments in local newspapers.[11] The Stowbridge seeder was advertised as being able to seed grass seeds, and

---

9. Interview with former North Dakota State Senator, Mr. N. N. Nelson, 1006 Cottonwood, Grand Forks, North Dakota, May 24, 1949.
10. Ibid.
11. Norman County Index, Ada, Minnesota, February 1, 1884.

grain, and to spread plaster, salt, ashes, or fertilizer. The seed was broadcast in a downward direction to prevent undue scattering by high winds. When pulled by a team of horses, such a wagon seeder could seed four acres while the horses were walking one mile.

It must not be supposed that the machinery used in the Valley was uniform throughout at any one period. Frequently the pioneer used primitive tools through necessity. As soon as the early farmer found better implements available and could afford to buy them, he discarded his old tools and obtained better ones.

Most of the great inventions of farm mechanization had been made, although many improvements, especially as to power farming were still in the future. The 1870's and 1880's were still very much a time of trial and experimentation in production of farm machinery and certainly no finer proving ground could be found than the Red River Valley of the North. An issue of the Norman County Index[12] of the time gives an interesting account of an invention designated to decrease the amount of power required for plowing. This invention was tried out near St. Paul. Three rollers were placed in the moldboard of the plow to carry the dirt from the furrow above the moldboard and prevent it from sticking to the moldboard. Two large rollers were also placed in the rear of the plow to lift the plow up and assist in carrying it along. A dynamometer was attached in front of the plow and also to the whiffle for the purpose of measuring the power required to drag the plow. A John Deere plow was used. A first test, without the attachment, was made, and it was found that 613 pounds of power were needed to pull the plow. A

---

12. Norman County Index, May 25, 1883.

second test, with the attachment, showed that only 429 pounds of power were needed. This invention, stated the article, could be attached to any type of plow. Among the makes of plows sold at the time were the John Deere, the Furst and Bradly, and the Monitor.[13]

In all the dramatic story of the Red River Valley no episode is more romantic than that of the giant bonanza farms. Among the greatest of these and typical of them was the great Dalrymple farm in the neighborhood of Hillsboro, North Dakota. Oliver Dalrymple, an experienced large scale wheat farmer was selected as manager of the vast holdings of George W. Cass and Benjamin P. Cheney. He was appointed in the spring of 1875 and at once took charge.[14]

Breaking of the prairie sod was the first task required. The work was vastly different from that which had confronted Deere and Andrus on the Illinois prairie a half century earlier.

Whereas the Illinois settlers of the 1820's and 1830's had been forced to use a huge unwieldy plow pulled by many yoke of oxen, the Red River farmer of the 1870's and 1880's had a neat steel plow, the best of its day. The Illinois farmer had had to contend with a heavy sticky soil, often interlaced with roots and interspersed with rocks. The rich lands of the Red presented only the fine mass of grass roots in its sod.[15]

The Dalrymple farm opened for crop raising in the spring of

---

13. Norman County Index, July 25, 1884.
14. John Lee Coulter, "Industrial History of the Valley of the Red River of the North," Collections of the State Historical Society of North Dakota, Bismark, North Dakota, Tribune, State Printers, 1910, III, 570.
15. Ibid.

1876. At that time in the Valley the plows used were of several types.[16] These included the twelve inch walking plow, with some of fourteen or sixteen inches. There were also some sulky plows. By 1879, the two-bottom gang plow began to be used. On the larger farms, such as the Dalrymple, a brigade of as many as twenty of these plows might move down a field at once. They could plow some five acres each per day, and twenty of these gang plows could turn over a section of sod each week. From four to seven horses were used for power.[17]

The breaking of the sod, or first plowing, was generally completed by the middle of July so as to give the soil time to become well rotted before the second plowing, which was begun in September and might be continued until freeze up in November. When preparing new prairie ground for crops, this second plowing was necessary because the first plowing did not break up the tough sod thoroughly enough. This operation was called back-setting or cross plowing because the direction of the furrows was at right angles to that of the first plowing. The breaking, according to an estimate by Oliver Dalrymple, manager of the vast farming enterprises known by his name, was nearly $2.50 per acre for the first plowing and about $1.75 for cross plowing.[18]

In the spring, as soon as the frost went out of the ground, seedings operations commenced. The ground was harrowed both before and after seeding. Eight-foot broadcast seeders were almost universally used in the Valley during the 1880's.[19]

---

16. Coulter, 572.
17. Ibid.
18. Ibid., 571.
19. Ibid., 572.

Scotch iron-tooth harrows were used to cover the seed. Each section of these harrows contained seventy-two teeth, but one section was seldom used alone. At first two sections, which required a team of horses to pull them, were used, but by 1879 four sections were generally fastened together. Such a harrow required four horses, harnessed abreast, for power. A compound or set of harrows of this type, twenty feet wide, could be managed. The fields were usually harrowed three times after seeding if time permitted before the grain became well sprouted. Wheat was the king of the crops, but after the wheat, usually Red Fife, was in, some oats and barley was planted for feed.[20]

The bonanza farms of the Red River Valley of the 1880's and 1890's were certainly among the greatest in the world up to that time and few estates have exceeded them in size since. The Dalrymple holdings comprised some 100,000 acres in all. The wheat acreage was increased from 13,000 acres in 1878 to 65,000 by 1895. This vast farm was divided in 1896 into the Dalrymple, Howe, Cheney, and other farms.[21]

Naturally, a farm of such extensive acreage as the Dalrymple could be operated only through skillful management. The cultivated land of this holding was subdivided into 2000 acre tracts, each having its own set of buildings, its own superintendent, and its own foreman.[22]

Another bonanza farm of the period was the Grandin farm in the Mayville, North Dakota vicinity. It comprised 38,000 acres and was

---

20. Coulter, 572-573.
21. Lamphere, 22.
22. Ibid.

divided into two units, one near Grandin and the other near Mayville. The first wheat crop on the Grandin holdings was produced in 1878. The two units of the farm employed some three hundred men, and used three hundred horses, one hundred plows, and fifty seeders.

Still other farms of the bonanza type were the Lockhart farm, north of Ada, Minnesota, the Keystone farm, some fifteen miles east of Grand Forks, and the Wheeler farm, northeast of Stephen, Minnesota. All of these great estates are now split into smaller farms, a process which took place generally during the early years of the twentieth century.

The writer is somewhat familiar with the story of the last three bonanzas mentioned, especially the Wheeler, as his father, A. B. Isaacson, was a pioneer farmer of the Stephen vicinity from 1882 to 1916. Old-timers with a Paul Bunjan twist used to say, when speaking of the size of the Wheeler fields, that if a man started a furrow his grandson would have to finish it.

By 1900, tillage and seeding implements, in common with other farm machinery, may be said to have reached a plateau in their development, at least as regards their use in the Red River Valley.

By that time, the sulky and gang plows, the four section drag or harrow, and the twelve to fourteen foot drill were standard implements throughout the Valley. The four-horse shoe drill, very much like the modern type, had been introduced into the Valley by 1885 and gradually supplanted the earlier two-horse broadcast seeder.[23]

---

23. Coulter, 592

The deterrent to further advancement was the lack of a convenient power unit to replace power supplied by horses. It is true, that with the addition of the drawbar, steam tractors could be used for plowing. However, the steam tractor was not very successful. It was heavy and slow, and a licensed engineer was required to operate it. Fires from sparks were not uncommon, and boiler explosions were a serious problem.[24] Thus, steam power, while it was certainly employed for plowing and other drawbar work, was not the solution to the problem of providing an adequate, convenient farm power unit for field work.

It is true that gasoline tractors were in existence for some time before 1900, but there seems to be no evidence that their use was widespread either in the Red River Valley or elsewhere. Most of the early models took no account of the dirt problem which is inherent in farm field work.[25] Often, gearing and other parts were exposed so that dirt, sand, and other foreign particles could enter the mechanism. Moreover, lubrication was inadequate. As a consequence vital parts would be likely to wear out quickly and require frequent replacement.

Among the early types of gasoline tractors developed were the Burger, built and operated by L. F. Burger near Madison, South Dakota, in 1889, and the Sterling brought out by a Mr. Hockett and

---

24. Farm Power and the Post-War Tractor, Remarks by L. B. Sperry, Manager of Engineering, Farm Tractor Division, International Harvester Company, before the Chicago Section of the Society of Automotive Engineers, at Knickerbocker Hotel, Chicago, Illinois, February 8, 1944, International Harvester Company, Chicago, Illinois, 1944. Hereafter this source will be cited as "Sperry."

25. Sperry, 5.

a group of farmers, near Sterling, Kansas, in 1893. The Case Company built their first gas tractor in 1892, while the Hart-Parr was brought out in 1901. These early models were very much in the experimental stage and no great development seems to have occurred until manufacturers were spurred by the stimulus of the World War I.[26]

It is extremely doubtful if any of these makes or other types of tractors were in anything like general use in the Valley before 1919 or 1920.

Indeed, much evidence may be presented to the contrary. Mr. Carl Riboski,[27] a pioneer farmer and farm hand of the Stephen, Minnesota area, expressed the opinion that the gang plows, each pulled by from five to seven horses, continued to be the main reliance for plowing until at least 1917 or 1918. Mr. Riboski's parents settled in Wright Township, one mile south of Florian, Minnesota in 1894. Mr. Riboski grew up in the area and later worked on the farm of Charles Warner, a large-scale farmer and threshing machine operator of that vicinity. He worked for Warner as a field hand in 1917, and states that the gang plow and horses were used at that time, and that horses were also used almost exclusively for harrowing and seeding.

The horse, then, probably continued to be the main source of power for farm tillage until the decade of the twenties. According to one reference, horses were at their highest peak, in numbers, on

---

26. Sperry, 5-8.
27. Interview with Mr. Carl Riboski, 205 North 4th Street, East Grand Forks, Minnesota, June 25, 1949.

American farms in the period 1914-1918 with 27,000,000 listed in 1918 as against only 85,000 tractors on farms at that time. By 1923 these figures had changed to 24,000,000 horses and 428,000 tractors, or about one tractor to eight or nine horses.[28]

It is apparent, therefore, that the horse-drawn plow, harrow, seed-drill and cultivator had become the principal implements of tillage in the Red River Valley of the North by the first decade of the twentieth century and that they remained so until after the period of World War I.

---

28. Sperry, 17.

CHAPTER III

HARVESTING AND THRESHING MACHINERY IN THE RED RIVER VALLEY

When the farmer, after overcoming adversities of soil and weather, has plowed and harrowed his land and seeded his crop, the real gamble of his occupation becomes apparent. For when he has accomplished these things, he must wait. There is no manner in which the most grinding toil can insure him returns, or the most brilliant invention guarantee him success. He must wait for sun and weather. If the rains come to sprout his grain, if sun and searing winds do not wither it, if grasshoppers or hail do not destroy it, then, perhaps, he may harvest a crop.

At no place and in no time was this more nearly true than in the Red River Valley of the North during the last quarter of the nineteenth and the first quarter of the twentieth centuries. For one crop, and one crop only was king.[1] The Valley was a region of wheat. Diversification, which had been practiced to some extent earlier and became general later, was but little thought of. The farmer might plant what barley or oats he needed to feed his animals. He usually kept a little livestock, and he might spade or plow in a few rows of potatoes for table use, but in the main it was wheat; spring wheat, hard northern wheat which occupied his attention and upon which his livelihood depended.

"The beginning of wheat raising in the Red River Valley was in

---

1. John Lee Coulter, "Industrial History of the Valley of the Red River of the North," Collections of the State Historical Society of North Dakota, Bismark, North Dakota, Tribune State Printers and Binders, 1910, III, 569-596.

the Selkirk settlement near Fort Garry, now Winnipeg,"[2] and stretching southward to Pembina. In 1817, 1818, and 1819 swarms of locusts destroyed the wheat, but in 1820 the first wheat crop in the Red River Valley was harvested.[3] The Selkirk settlement continued to grow some wheat throughout the years. Most of it was ground in local mills for consumption in the neighborhood, but some was sold, as flour, to outlying settlers.

The Selkirk people cut their grain with sickles, and bound it with small supple branches, of the willow. Wheat, barley, and oats were all threshed out during the winter season on the barn floors. The flail was the only instrument used for threshing.[4]

For some fifty odd years the Selkirk men swung their sickles each harvest and they and their families flailed out the grain each winter. The flour was ground in windmills or at home in small, hand coffee-mills. Their efforts constituted the only farming attempts of consequence in the Valley.

Then across Minnesota from Duluth came the twin steel rails of the Northern Pacific. It reached the Valley at Crookston, Minnesota by October of 1872[5] and rapidly pushed on to the West. In 1878, the "Empire Builder," James J. Hill, pounced like a hawk on the bankrupt St. Paul and Pacific, and used it as the nucleus of his own system, the Great Northern Railroad.[6] With the railroads came the farmers.

---

2. George N. Lamphere, "History of Wheat Raising in the Red River Valley," Collections of the Minnesota Historical Society, St. Paul, Minnesota, Minnesota Historical Soceity, (Printed by Great Western Printing Company, Minneapolis, Minnesota), 1905, X, Part I, 2.

3. Ibid., 4.

4. Ibid., 7.

5. Coulter, 561.

6. Samuel Eliot Morison and Henry Steele Commager, The Growth of the American Republic, New York, Oxford University Press., 1942, 2 Vols., II, 109.

They poured into the Valley of the Red by thousands, and tens of thousands. Back over the rails, to the south and east went the long lines of grain cars bearing the Valley's hard northern wheat.

Wheat was king in the Valley, but wheat must have three servants, Nature, Man, and the Machine. Nature contributed soil and weather. Man gave muscle, brain, will, and courage, but the Machine was urgently needed. Not the sickle, the scythe, the flail, and the walking plow, but the gang plow, the reaper, the thresher, the broadcaster and the four-horse harrow.

Most of the first settlers had little enough of these. Mr. Knute Nygard, an early settler at Mekinok, North Dakota,[7] tells how his family harvested their first crop in the Valley in the summer of 1876. This family of Norweigan immigrants cut their first grain with a scythe and cradle. The bundles were tied with a wisp of straw, a procedure at which the oldtimers were particularly adept.

When the time came for threshing, the Nygard family was perhaps fortunate that their crop was small, for the only appropriate tool they had was the flail. Nevertheless, they threshed out a good part of their crop with this instrument. The remainder they threshed by laying the bundles out in rows on the hard ground and driving their oxen over them. The grain still had to be cleaned of chaff and dirt, but this task was accomplished by throwing the grain repeatedly into the air with a shovel and letting the wind blow

---

7. Interview with Mr. Knute Nygard, 622 Walnut Street, Grand Forks, North Dakota, April 21, 1949.

away the foreign particles. In this manner, then, did the pioneer Nygard family, and many others, secure their first harvest in their new home.

The following year, 1877, the Nygards were more fortunate. They obtained a reaper with a self-rake attachment to cut their grain. This attachment would sweep the grain from the machine in bunches, but men still had to follow the machine to bind it. A man acting as a binder, would take a handful of wheat straw, making it as long as he could. With this in his hands he would bend over a bunch of grain and bind it with a sudden adroit twist. He made his tie in such a manner that the straw binding material practically held itself from unfastening. A practiced man became amazingly skillful, and the bundles so tied were compact and secure.

The grain then had to be shocked, and after that stacked, for that year the community was to have a great improvement in threshing. A "Minnesota Chief" was to be secured for the work. This machine was a horse-powered sweep separator and power unit. The particular machine which the Nygards secured was a six-sweep machine. In other words, it had six long arms, to each of which a team of horses was hitched. These arms radiated out from the working mechanism of the machine. A driver stood on a platform above the mechanism and drove all six teams, in a circle, employing a long whip to keep the horses moving. A tumbling rod, sometimes as long as forty feet connected the power unit to the thresher itself.

In the morning, the power unit and thresher would be placed in position; that is, a "set" would be made. The machine was usually placed so that no move would be necessary until at least four stacks of grain had been threshed. The men who pitched the

bundles from the stacks had a tiresome, and at times a very uncomfortable job. This was especially true if they were obliged to pitch against the wind as chaff and dust were constantly blowing about. Wheat and oats stacks were not unbearable, but barley with its sharp beards could be extremely disagreeable. In addition, the men would often work for several hours at a stretch without a break.[8]

As the years passed, the Nygards, and their neighbors obtained better tools. A reaper with an elevator and canvass conveyor came into use. This machine had a platform on which two men stood and bound the grain. In the early 1880's, a wire-binder was used for a few years. This machine, however, created a new job, that of band-cutter, when the time came to thresh the grain. The band-cutter's work consisted of standing by the threshing machine feeder as the straw was pushed into it and cutting the wire with a pair of large shears. Otherwise the grain would not thresh properly. However, the wire pieces in the straw pile made it dangerous to feed this fodder to cattle.

Mr. Nygard stated that the types of threshing machines which came to be used in his vicinity were the Minnesota Chief, the Case, the Minneapolis, and the Buffalo Pitts. He remembered self-feeders being used in the middle 1890's, while windstackers did not come into use until somewhat later.

The experiences of the Nygards, a typical family of Red River Valley settlers, together with those of many other pioneer farmers,

---

8. Interview with Mr. Nygard, April 21, 1949.

would seem to justify two conclusions. First, that when forced to do so, the Valley pioneers would farm with very primitive methods, but that they continued such outdated procedures only as long as it was absolutely necessary to do so. In this latter characteristic they were quite different from the longer settled peoples of the East.

It should be noted, however, that the lag in the use of better and more modern machinery by the farmers of the eastern portions of the country was not necessarily due to a lack of progressiveness, but was rather a matter of geography. The farms of the eastern United States were much smaller than those of the Red River Valley. They were also, in many cases, stoney and hilly. In a word, these smaller farms were not as well suited as the Red River Valley farms for the use of modern machinery, nor would the income from a small eastern farm justify the use of such expensive equipment as binders, and steam threshers. Indeed it was the type of extensive farming followed in the Red River Valley and other regions of the central and western states that created the demand for machinery which would be suitable for large scale farming.

John Lee Coulter, author of "Industrial History of the Red River Valley of the North," seems to reach the same conclusion as to the use of old type as contrasted to new type machinery when he states:

> Whereas in old New England and the South, the single plow, the hand sowing, the scythe and cradle, and the flail persisted to a considerable extent; and although some of these methods were necessarily used by some frontier settlers, the machinery introduced into the Red River Valley was largely--almost entirely--modern, well constructed, efficient and labor saving. It was also of such size

that the farmer was able to farm a very large area.[9]

As a matter of fact, the more modern the machinery became, the more land a man was inclined to farm. If he had forty acres in wheat, he would require a binder, which might cost some $325, to harvest it. With the one machine he could cut 100 or 150 acres in a season. Accordingly he hurried to get as much land under cultivation as he possibly could.[10] Nor did he worry particularly about the wear and tear on the machine. The seventies and eighties were decades of rapid improvement in farm machinery, and the farmer was apt to "turn in" his old machine for a new one every few years, in any case.

Indeed, this period was one of rapid and successful changes in farm machinery. By the end of the seventies the Marsh Harvester was universally used in the Valley. Successful packers made their appearance by 1880. The packer referred to here was not the soil packer, discussed earlier, but a device added to the reaper by which the straw was pressed into a tight bundle. The packer and the knotter, the tieing mechanism, are the parts of the binder which make the bundle. Until 1879, the wire binder was accepted as a success. As far as the grain growers were concerned, it was good enough. It enabled them to get their work done more quickly than before, saved labor, and did not injure the threshing machines. The wire might be harmful to livestock, but the wheat growers kept few cattle anyway.[11]

---

9. Coulter, 568.
10. Ibid., 592.
11. Ibid., 593.

At this point, however, a serious controversy arose, because the Minnesota millers began to object violently to the wire binder. Pieces of wire were constantly getting into the wheat and from thence into the flour. In 1878, the Minnesota Millers Association passed resolutions to dock any wheat with wire found in it ten cents a bushel. The millers also claimed that the bits of wire damaged their machinery.[12] On the other hand, the millers of Wisconsin and Illinois feared that too much agitation might discredit northwestern flour and urged that some other action be taken.[13]

Three possible solutions were offered. Millers were urged to clean the grain before grinding, a remedy which did not prove feasible. Farmers were advised to pull out the wires as the bundles were fed into the feeder. This, too, was tried, but wire pieces still escaped into the grain. The third remedy was to abolish the use of wire. This was made possible when a better type of twine was developed, and when John P. Appleby perfected his twine binder. He accomplished this in 1879, and by 1885 the twine binder had almost entirely replaced the wire binder.[14]

Until about 1885 the portable steam engine was used to supply power for threshing. The portable engine was not stationary, because it was mounted on wheels and could be hauled from place to place by a team of horses. On the other hand, it was not self-propelled and depended in all cases on outside power for locomotion. This type of engine was used mainly for threshing grain but was also

---

12. Coulter, 593.
13. Ibid., See also William T. Hutchinson, Cyrus Hall McCormick, New York, D. Appleton-Century Company, 1935, 2 Vols., II, 539 and 551.
14. Coulter, 593-594

used for sawing wood and other operations that required power. At the same time that the portable engine was in general use, some horse power threshing outfits were also employed. On the other hand, some portables were still to be found even after traction engines came into general use. The Case Catalog of 1904, for example offered all three types of power units for sale.[15]

By 1885 the traction engine had come into general, though not exclusive, use in the Red River Valley.[16] Up to that time both engine and separator had to be pulled from place to place by horses whenever a threshing outfit made a move from one location to another. This had been a slow process and meant that the crew was idle while the move was being made. One may suppose that the men did not particularly mind the temporary delay involved, but the loss of time was no doubt irksome to wheat growers and threshing machine operators.

Self-feeders came into general use around the late 1890's, while wind-stackers, also in the nineties, brought the final improvement of consequence in threshing machine separators. From about 1905 until the day of the combine threshing operations were to remain relatively stable.

By the middle 1870's farm machinery had reached a stage of development suitable for extensive agriculture. Moreover it was readily available to farmers in the Red River Valley. The leading manufacturers of farm implements had already located their factories in what was at that time considered to be the West. Cyrus Hall

---

15. J. I. Case Threshing Machine Company, The Case Catalog, J. I. Case Threshing Machine Company, Racine, Wisconsin, 1904, 18-59.

16. Coulter, 594.

McCormick, in 1847, and Hiram A. Pitts, in 1852, had each established headquarters in Chicago. J. I. Case was in Racine, Wisconsin by 1844 and John Deere had built his factory at Moline, Illinois, in 1847.

For these reasons, therefore--the sufficiently high development of farm implements and their availability--the bonanza farms of the Red River Valley were made possible by the middle 1870's.

Perhaps, as already mentioned, the most famous of the bonanzas was the Dalrymple holding. Just what constituted the Dalrymple farm is somewhat indefinite. Oliver Dalrymple, himself, had control of some 55,000 acres by 1880. In addition he managed one of the hugh Grandin farms, besides the Cass and Cheney farms. Each of these was a bonanza in its own right.[17] To be considered as a bonanza, a farm must comprise from four to fifteen sections or more of land, or, stated differently contain from three to ten thousand or more acres.

The harvest and threshing season on the bonanza farms was epic in its proportions. Barley came first, about the middle of July, then usually oats, while by the first of August, in most years, the wheat was ready. The harvester machines after 1775 were almost always of the Marsh type, while after 1880, the twine-binder had already replaced the wire-binder throughout the Valley.[18] These binders made a six foot cut of standing grain each round. A brigade of a dozen or more machines were superintended by a foreman on

---

17. Coulter, 580.
18. Ibid., 573.

horseback. Behind the binders followed the shockers, who stood the bundles on end and braced them together to make a shock. About twelve bundles were required for each shock. On the large farms the grain was never stacked, because the bonanzas had the facilities to begin threshing immediately after harvesting was finished. On the other hand, most of the homesteaders had no threshing outfit of their own and might be obliged to wait several weeks or even months for a traveling machine to reach their farms. Therefore, as a rule, they stacked their grain, as it would stand much longer that way than in the shocks and also preserve its quality much better.

By 1879, on the Dalrymple farms, about 400 work animals were employed. During the rush of the harvest and threshing season over 400 men were needed, and twenty-one threshing units were in the field. In 1878, on one of the Grandin farms of the Dalrymple system 5000 acres were in crop. The farm used 79 plows, 55 harrows, 24 seeders, 28 self-binding harvesters, 6 steam threshers, and 40 wagons.[19]

At the present time with our vastly greater mechanization only a fraction as many men and machines would be required to do the same amount of work as was accomplished by the huge crews and numerous machines of the 1870's and 1880's. Yet, what our day has gained in the cool efficiency of super-mechanization, it has lost in the color, and romance, of the big farms of the earlier years. Never again, perhaps, will young ambition, courage, and vision combine in such a manner in the Valley. The big farms were not all good.

---

19. Coulter, 577.

Ruthlessness, and greed were there, and a hundred small farms supporting a hundred families are far better for the general economy than a giant Dalrymple estate. Yet, those were days of strenuous efforts rewarded, of stupendous dreams fullfilled. They were the days of the "Bonanza."

While the bonanza farms each possessed a number of threshing outfits, many of the smaller farms could not afford even one machine for this purpose. These smaller places were served by traveling threshing machine operators who went from farm to farm to thresh the grain.

One such operator was Mr. Lars Larson,[20] a pioneer farmer and thresher of the Mekinok, North Dakota, vicinity. Mr. Larson has had forty-seven seasons experience as a threshing machine operator, doing his last threshing in 1946. He began his experiences as a thresher in the Mekinok neighborhood when as a boy of nine years he served as a bandcutter. Three years service as a "feeder" followed. In the days before the self-feeder became general in the Valley, a man had to be employed to push the grain directly into the machine.

The man serving as feeder stood directly in front of the threshing machine feeder (not a self-feeder) and seizing a bundle from each side, spread out the straw and pushed it into the cylinder of the machine. On each side of the feeder was stationed a bandcutter who cut the bands (at first of wire, but later of twine). Nice timing between the man doing the feeding and the bandcutters was necessary, since the feeder seized a bundle of grain from each side just as the bands were cut. It will be noted that three men

---

20. Interview with Mr. Lars Larson, 422 Walnut Street, Grand Forks, North Dakota, April 21, 1949.

were required to do the work later accomplished by the self-feeding device.

The first thresher that Mr. Larson remembers was a six-sweep horse-power, used in 1883 and 1884. The first steam-power threshing machine, according to Mr. Larson, was brought to the Mekinok area by a man named Nils Nelson. The first self-feeders were introduced about 1895, and became prevalent around that neighborhood in 1896 and 1897. Mr. Larson, himself, did not use a wind-stacker until about 1908. Before that time the straw was pushed away from the machine by means of a bucking pole. This last named implement was simply a long pole with a horse hitched to each end. If the straw was to be saved as fodder, several men were employed to stack the straw in the same manner as hay is stacked.

Mr. Larson's first windstacker was a Maple Bee Blower which he installed on a Gars-Scott separator.

With the rapid settling of the Valley during the 1880's and 1890's, and the increasing demand for farm equipment, numerous machine companies and implement dealers entered the area to compete for the farmer's trade. In the Grand Forks Plain Dealer the following machinery was advertised for sale in September 14, 1882: Hoosier Broadcast seeder, Buckeye mower, Easterly and Buckeye twine binders, John Deere Walking and gang plows, Vibrating Thresher, by C. Altman and Company of Canton, Ohio, the Minneapolis Twine Binder, Buffalo Pitts thresher, Superior broadcast seeder, Minnesota Chief thresher, and Minnesota Giant engine.[21]

---

21. Grand Forks Plain Dealer, Grand Forks, North Dakota, September 14, 1882.

The Aultman threshers mentioned above were first manufactured by Cornelius Aultman in 1849 at Canton, Ohio.[22] In 1856, Lewis F. Miller brought out the first of the famous Buckeye mowers, also at Canton Ohio.[23]

In the late 1890's, the Northwestern Grass Twine Company of St. Paul, Minnesota, advertised grass twine in the same paper.[24] According to the advertisement, this twine ran 250 feet to the pound. It was put up in twenty pound balls, and according to the advertisement would not rot from exposure nor be injured by the attacks of insects.

In the 1880's the Norman County Index, Ada, Minnesota, carried advertisements showing that Nelson A. Mott, a local dealer, sold the Beloit Harvester and Binder, North Star and Triumph seeders, and Nickols and Sheppard Company threshers.[25] In the same issue of the Index, Cambell and Olson, also a local Ada firm, advertised the Plano Harvester and Binder, Warrier mowers, Monitor hayracks, St. Paul plows, La Cross and V-tooth harrows, Barber seeders, and Whitewater wagons. Aultman and Taylor saw mills, threshers, and clover hullers were also advertised.[26]

Again, in an Index issue of the 1880's, Fish and Ashelman, agents, advertised Walter A. Woods binders, mowers, and reapers, a full supply of extras, and binding twine and wire.[27] It would seem

---

22. Hutchinson, II, 371.
23. Ibid.
24. Grand Forks Plain Dealer, September 22, 1898.
25. Norman County Index, Ada, Minnesota, May 25, 1883.
26. Ibid.
27. Ibid., July 27, 1883.

significant that wire as well as twine was offered for sale, indicating that some wire binders were still in use in the middle 1880's.

The Walter A. Wood Company had been founded in 1853 at Hoosick Falls, New York. Wood was a comtemporary of McCormick, who held a more cordial opinion of Wood than he did of most of his rivals. The Wood Company had brought out an automatic mower and self-rake, and by 1870 was preparing to enter the field with an automatic binder.[28]

A favorite advertising scheme of implement companies was to resort to a testimonial, in which several farmers of a community would swear publicly that a particular machine was the best they had seen in operation. In a local Valley paper of the early 1880's, the testimonial given below quite typical of those used at the time, appears:

> We, the undersigned have witnessed the work of the St. Paul Harvester and Appleby binder in some of the hardest grain for any machine to cut; it being short barley and also timothy on the farm of Mr. J. Merkins, the barley running from ten to eighteen inches long. It bound both the short and the long, not missing a single bundle, and was pulled by two horses, not weighing over 1,100 pounds each. We claim that the St. Paul Harvester and Appleby binder is a light draft machine, and does the best work of any machine we have seen, and we advise all farmers who need a machine to buy a St. Paul.[29]

This testimonial was signed by ten Norman County farmers.

Further advertisements of machinery appearing in the 1880's include Deering binders, and mowers, Hollingsworth and Favorite horse-rakes, Milburn wagons, the Osborne Self-binder and Mower

---

28. Hutchinson, II, 542-543.
29. Norman County Index, August 3, 1883.

(one machine), and J. I. Case steam threshers and horse-power threshers.[30]

Walter A. Wood's New Iron Frame Binder, advertised as having the only successful bundle carrier made, appears in an advertisement of the middle 1880's,[31] while J. I. Case thresher (a steam thresher), the Champion self-binder and mower,[32] Deering Standard Twine Binder, Buckeye seeders, and drills, Winona plows, and Thomas hayrakes were other machines presented for sale through the medium of the news papers.[33]

By the late 1890's, McCormick binders and mowers, Studebaker wagons, Oliver plows, Advance threshers, and Fuller and Johnson rakes were being offered for sale.[34] The De Laval Cream Separator was advertised in 1898,[35] while the year before Montgomery Ward and Company advertised binder twine.[36]

From the above advertisements the conclusion may be reached that as early as the middle 1880's a large number of farm implement companies were offering a great variety of farm machinery for sale, that the Red River Valley was becoming rapidly mechanized, as far as the farm unit of power, the horse, would permit, and that constant changes and improvements were being made. Perhaps, two of the most important changes were the replacement of wire binders by twine binders and horse-power threshers by steam threshers by the middle or late 1880's.

---

30. Norman County Index, July 25, 1884.
31. Ibid., August 1, 1884.
32. Ibid., July 17, 1885.
33. Ibid., August 20, 1886.
34. Ibid., November 5, 1897.
35. Ibid., July 28, 1899.
36. Ibid., July 25, 1898.

In selecting their machinery the many homesteaders of the Red River Valley were always inclined to follow the lead of the few great bonanza farmers. Thus such wheat kings as Oliver Dalrymple and others of his kind became a target for the sales efforts of the big implement companies during the 1870's and 1880's. The McCormick Company tried strenously to gain the Valley trade. It made the first sales there in 1874, and displayed a wire-binder on the Dalrymple farm in 1876. Nevertheless, the Walter A. Wood Company was the early leader in the Valley. During 1877, 1878, and 1879 it sold over one hundred binders to Dalrymple. The Osborne Company, also was prominent in the Valley.

McCormick binders, however, had overtaken rival machines in sales by 1880, when it was claimed that half the grain in the Valley was cut by McCormick binders.[37] Scarcely had the McCormick company gained the lead in sales when it was again threatened. The Wood, and Osborne outfits beat McCormick to the field with their twine binder. By extremely clever advertising, however, the McCormick people persuaded the farmers that the wire-binder was really best until McCormick was able to come out with his own twine binder. Thereafter he gave up the manufacture of wire-binders and by 1883 was selling the remaining machines of the latter type at any price that was offered.[38]

From the evidence presented it is clear that the development of harvest and threshing equipment in the Red River Valley to 1915 falls into three stages or periods. The first period was one of

---

37. Hutchinson, II, 719-721.
38. Ibid., II, 722-725.

comparatively primitive farm implements, followed by a time of growth and transition, and finally a period of relative stability when the development process had reached a plateau in its growth, waiting until a new convenient unit of farm power should be introduced.

The first, rather primitive, period began with the coming of the first settlers in the early seventies (except for the Selkirk settlement, which was small and confined) and lasted for only a few years. When the first farmers used scythe and cradle, and other outdated tools, they did so only because of necessity and had no intention of continuing to farm in such fashion.

By 1880, the period of growth and transition was well on its way. Change in essential design and added improvements was so rapid that no description of a harvester or thresher can be given which would be valid for the entire period. For instance, if a self-rake reaper of 1870, is described, it should be kept in mind that in a few years this machine was replaced by the wire binder, and that the wire binder in two or three years in its turn gave way to the Appleby twine binder.

In like manner, threshing operations were accomplished in rapid succession by horse-power-sweeps, horse drawn steam threshers, and self-propelled steam threshers.

By about 1900, or 1905 at the latest, most essential changes had been made in both harvesters and threshers. This condition existed, in the main, until after World War I, and the first twenty years of the twentieth century comprises a period of relative stability.

The self-binding harvester of the late period consisted essentially of:

> (1) a drive wheel in contact with the ground; (2) gearing to distribute the power from the driver to the various parts; (3) the cutting mechanism of the serrated rocipricating knife, driven by a pitman from a crank, and guards or fingers to hold the grain while being cut; (4) a reel to gather the grain and cause it to fall in form on the platform; (5) an elevating system of endless webs or canvasses to carry the loose grain to the binder; and (6) a binder to form the loose grain into bundles and tie with twine.[39]

The thresher of 1905 also had reached its highest stage in all essential details. The cylinder and concaves shelled the grain, the grate, the beater, the checkboard, and the straw rack separated grain and chaff from the straw, the shoe, fan, windboard, screen, and tailings elevator separated the grain from the chaff and dirt, the grain elevator delivered the grain to one place, and the blower delivered the straw to the pile.[40] In addition to the above essential characteristics, the self-feeder, the band cutter, and the wind-stacker or blower were in general use in the Red River Valley by 1905, and were to be found on most threshing machine separators. By this time, too, the traction or self-propelled steam engine was in common use.

The size of a separator was indicated then as now by the width of the cylinder, and the width of the machine itself, expressed in inches. Thus a machine with a cylinder width of 32 inches, and a body proper width of 54 inches would be known as a 32-54, usually expressed as 32x54 inches.[41] By 1910 the separators used in the

---

39. J. Brownlee Davidson and Leon Wilson Chase, Farm Machinery and Farm Motors, New York, Orange Judd Company, 1910, 143-144.
40. Ibid., 207.
41. Ibid., 217-218.

country as a whole varied from 18x22 inches to 44x66 inches.[42]

The writer having worked in the harvest fields of the Red River Valley annually from 1922 to 1931, and occasionally thereafter, is inclined to believe that the same is true for that region. During those years the smallest separators which the writer noted were machines with an 18 inch cylinder while the largest machines of regular make had a 44-inch cylinder. A few separators, called "specials" were even larger. These specials however had to be especially ordered from the factory, as they were not listed in any catalog. By 1922, there were many small machines, powered by gasoline tractors. The very large machine was becoming a rarity.

A typical threshing machine of 1910 in the Red River Valley might well have consisted of a 16-horse power steam self-propelled engine and a 36x58 inch separator. Such a machine would require ten bundle haulers, four fielders, two spikers, three grain haulers, a water hauler, a fuel hauler, an engineer, and a separator man. The bundle haulers were the men who gathered the grain shocks in wagons and hauled them to the machine, while the grain haulers hauled the grain from the machine as it was threshed. These men were teamsters as well as bundle haulers since horses were used for all of this hauling. The fielders were men who helped load the bundle-racks (wagons used to haul the bundles) but did not work at the machine. The spikers on the other hand worked continually helping to unload the bundle-racks as they were pulled in to the separator. The bundle-haulers both loaded and unloaded the bundles

---

42. Davidson and Chase, 218.

or sheaves. The bundles had to be thrown into the machine (a pitch-fork was the tool used) in a particular manner, always the heads of the grain first, and one bundle behind the other. Otherwise the grain would not thresh properly and some would escape into the strawpile. The engineer tended the engine while the water man and fuel men, as their titles indicated, supplied fuel and water for the engine. Thus, it will be seen that a big threshing outfit as described above required some fifteen teams of horses, and a crew of twenty-two men in order to operate. The writer as a boy saw many such outfits, and later worked on others that were very similar in most respects.

A big machine with a 36-inch or 40-inch cylinder would thresh from 500 to 1000 bushels of wheat a day or twice that amount of oats.[43] Up to 1910 or a few years later the big machines were popular. With the introduction of gasoline engines, smaller separators became more common. In the early twenties the massive old-timers became scarce. The writer recalls that in 1922, while working as a bundle hauler on a "tiny" section-and-a-half fragment of the old Keystone bononza of the 1880's, he climbed to the top of the separator of the outfit with which he was working and counted more than a dozen small threshers in the vicinity. These could be plainly distinguished by the mounting straw stacks from their blowers. Nearly all of them were powered by small gasoline engines.

By 1915 the signs of a new era in farm mechanization were apparent. Here and there on the level fields of the Red River Valley puffed the Rumley Oil Pull, the Titan, and the Hart-Parr.

---

43. Davidson and Chase, 218.

The old steamer might look askance at these upstarts, usurping his place, and powered by gasoline and kerosene. But just beyond the horizon were the Fordson, the John Deere, and the McCormick-Deering tractors. The progress of mechanization in the Valley had slowed to take breath after the headlong spurt of the 1880's, 1890's, and early 1900's.

The men of the decades of complacency could not see the burst of speed to come. They knew that they had seen the Valley grow from cradle-scythe to a 44x66 inch separator. They saw their broad fields of wheat, barley, oats, and fodder corn. They lived their busy lives, plowed their land and harrowed their seed, harvested their crops, and threshed their grain. They could not know that the 1920's and 1930's were to be years of stress and strain and revolutionary progress,,or that after the lapse of a generation, the restless, always moving spirit of the 1870's, 1880's and 1890's would stir itself again and once more try its strength in the Red River Valley of the North.

CHAPTER IV

MISCELLANEOUS FARM MACHINERY IN THE RED RIVER VALLEY

When the Red River Valley of the North received its flow of settlers, and when these people had secured the essential tools of the wheat culture, other farm implements were necessary to complete the agricultural picture. The farmer needed not only the plow, harrow, binder, and thresher, but also the hayrake, the cultivator, the wagon, and the corn planter. These and many other tools were required as the autocracy of the wheat king was lessened, and diversification entered the agricultural pattern.

Among the most important farm implements, other than the grain machines and the plow, required by the Valley farmers were haying tools. Until the advent of the gasoline tractor age, horses were the essential source of farm power and had to be provided with fodder. Oats could easily be raised, but hay also had to be secured. The harvest of grain followed immediately after the haying season, so time was limited and the best possible implements were necessary.

Broadly speaking, haying equipment is of course harvest machinery, but for several reasons it is more convenient to treat it separately. In the first place a line of implements quite different from harvest machinery is required for haying. Again, while the grain raised in the Valley was the chief cash crop, hay tended for the most part to be a fodder crop. Haying tools were somewhat simpler than the grain implements and required less cooperative effort to operate.

Just as the plow and cultivator sprang from the same source, so it may be said that the reaper and mowing machine had a common

ancestor. Many of the first plant cutting machines were described as machines for reaping and mowing.[1]

The famous first reaper built by Obed Hussey was really a mower, and it was upon principles which he established that the mower was afterward built.[2] Hussey's invention, patented December 31, 1833, presented the combination of reciprocating knife and slotted guards, which principle is used with improvements on all mowers of the present day.[3]

William F. Ketchum, who has been spoken of as the father of the mower trade, first put a mower, as distinct from a reaper, on the market, in 1847. The first mowing machine ran on one wheel and had a rigid cutting bar, that is, the bar could not be raised from the ground. The machine patented by Cyrenus Wheeler in 1854, had a flexible or jointed bar and two wheels.[4]

The jointed or flexible sickle bar was a definite improvement because the sickle could be raised to avoid stones and obstructions and could also be raised to an upright position and fastened in place when the mower was being moved on the road or from one field to another.

Inasmuch as the above mentioned improvements had all been achieved before 1870, the date which may be roughly considered as the starting point for any significant influx of settlers to the Red

---

1. W. R. Humphries and R. B. Gray, Partial History of Haying Equipment, Information Series No. 74, United States Department of Agriculture, Government Printing Office, Washington, D.C., 1944, 3.
2. Davidson and Chase, Farm Machinery and Farm Motors, New York, Orange Judd Company, 1910, 162.
3. Humphries and Gray, 6.
4. Davidson and Chase, 163.

River Valley, the mower was better developed for use in the Valley than were the reaper and thresher.

Among the companies offering mowers for sale during the 1880's through Valley newspapers were the Osborne,[5] Walter A. Wood,[6] Deering,[7] McCormick,[8] and Champion.[9]

Very prominent among the competing manufacturers was the Deering company. Included in a list of machinery advertised was the Deering Giant Mower which was capable of making a seven foot cut.[10] The Deering company had been founded by William Deering, who as a silent partner of E. H. Gammon, had moved to Chicago in 1873 and founded a machine business there. In 1879, Gammon fell ill, and Deering was placed in complete charge of the firm's affairs. In conjunction with John F. Appleby, Deering manufactured and sold some three thousand twine binders in 1880. The Deering company became a serious competitor of the McCormick enterprises during the decades of the 1880's and 1890's.[11] The Deering and McCormick interests joined in the short-lived American Harvester company of 1890-1891, and finally, with other companies, in the great amalgamation resulting in the International Harvester Company of 1902.[12]

Mr. N. N. Nelson,[13] Mekinok pioneer, described the first mower used on his father's farm, in the 1880's. This machine was a

---

5. Norman County Index, Ada, Minnesota, June 29, 1883.
6. Ibid., July 27, 1883.
7. Ibid., October 15, 1883.
8. Ibid.
9. Ibid., July 17, 1885.
10. Ibid., April 24, 1885.
11. Cyrus McCormick, The Century of the Reaper, Boston and New York, Houghton Mifflin Company, 1931, 107-109.
12. Ibid., 94.
13. Interview with former State Senator, N. N. Nelson, 1004 Cottonwood, Grand Forks, North Dakota, May 24, 1949.

McCormick make. It had a great many gears, shook badly, and was hard to ride. It had an iron pitman rod, and cut a swath of three and a half feet.

A very famous machine of the 1880's was the Champion Mower, which proved a great rival of the McCormick machine. Many Champion mowers appeared in the Valley during the 1880's and 1890's, and were sold for many years thereafter. This machine was manufactured at first by the Champion Machine company of Springfield, Ohio, and after 1880, by Whitely, Fassler, and Kelly, a business combine also located at Springfield.[14]

The large companies did not confine themselves to advertising in the papers in order to win the farmer's trade. Competitive field trials were a favorite form of rivalry. In 1899 the Champion company came out with a new mower and immediately challenged all comers to a trial of actual performance in the field. Under the terms of the challenge, each mower was to be driven against a tree by an employee of its rival, and afterwards proceed to cut hay. The McCormick company accepted these terms and a contest was arranged at Clare, Iowa. The McCormick man drove the Champion machine against the tree so hard that the cutter bar was bent back against the wheels and the implement ruined. The Champion driver then proceeded to break the pole of the McCormick mower which was rendered equally hors de combat. The net result of the contest was two completely ruined machines. Of course this was not the usual result of such contests, but the rival companies often employed under-handed schemes to defeat their rivals.

---

14. William T. Hutchinson, Cyrus Hall McCormick, New York and London, D. Appleton-Century Company, 1935, 2 Vols., II, 399.
15. McCormick, 102.

In the hay harvest before the time of improved implements, hay was cut with a scythe, spread to dry with a pitchfork, and gathered with a handrake. The first break in this laborous process came with the invention of the "whoa-back" rake. In dumping this rake, that is, in dropping the hay gathered when the rake could hold no more, it was necessary to stop and back the horses, hence the name "whoa-back." While the exact date for the introduction of this machine is not known it was in use by 1840. In fact, there is some evidence that horse rakes were used as early as 1812.[16]

According to another source, the "common horse rake" as constructed in 1840 was a very simple affair. It consisted of fifteen or eighteen wooden teeth projecting from both sides of a head-piece and the horse was hitched to these ropes. In the center were two handles by which the rake was guided. When the rake was full, the driver pressed forward on the handles and emptied the load.[17] With the "revolving wooden horse rake," introduced about 1840, the load could be dropped without stopping by simply raising the handles a trifle. The rake teeth made a semi-revolution as they deposited the hay, hence the name.[18] During the fifties, the wheel-horse rake with independent teeth began to come into use. Delano's horse-rake, which was one of this type, was one of the first wheeled rakes. This rake was very popular during the 1850's.[19]

---

16. Humphries and Gray, 19.
17. Percy Wells Bidwell and John I. Falconer, History of Agriculture in the Northern United States 1620-1860, New York, Peter Smith (reprinted with the permission of the Carnegie Institution of Washington), 1941, 296.
18. Ibid. 297.
19. Ibid.

The Walter A. Wood Company of Hoosick Falls, New York, is credited with bringing out the first spring-tooth rake. The teeth of this rake were so formed that each would "give" when any obstruction was hit, thus preventing the tooth from breaking. The first springtooth rake was made almost entirely of wood, except for the steel teeth.[20] The early rakes were dumped entirely by hand, but later an internal ratchet was provided on the wheels, which engaged a trip that was operated by the foot. The early rakes were provided with shafts, that is, they were one horse machines. Later rakes were furnished with a pole, and were pulled by a team of horses.

The list of patents issued for rakes by the United States Patent office includes: "flopover," 1822; spring tooth, 1839; dumping sulky, 1848; draft dumping, 1850; self-dumping, 1852; srpingtooth self-dumping, 1856; draft dumping, 1856, 1859, 1866, 1876, and 1884; drag dumping, 1866 and 1870.[21]

Competing companies, always eager for the trade of the Red River Valley, sold many hayrakes there in the 1880's and later. Among the different makes sold were the Monitor,[22] the Hollingsworth,[23] the Favorite,[24] Fuller and Johnson,[25] and the Thomas.[26]

Mr. N. N. Nelson, Mekinok pioneer, states that the first rake which he remembers, was made mostly of wood. It had steel teeth, or tines, however, but had to be dumped by hand.[27]

---

20. Davidson and Chase, 171.
21. Humphries and Gray, 21.
22. Norman County Index, May 25, 1883.
23. Ibid., October 15, 1883.
24. Ibid., July 25, 1884.
25. Ibid., November 5, 1897.
26. Ibid., August 20, 1886.
27. Interview with N. N. Nelson, May 25, 1949.

It may be somewhat of a surprise to learn that invention of the horse hay rake actually anti-dates the mower, but available evidence would lead to the conclusion that it does.[28] On the other hand, improvements in rakes seemed to have continued to a considerably later date than was the case with mowers. For instance, in the 1910-14 period the external ratchet was abandoned for an internal ratchet. The ratchet was a device which with the trip, or foot lever, dumped the hay. In 1917 the trip spring was redesigned, in 1920 the foot lever was strengthened, in 1924 the foot lever arrangement was further improved and in 1926 heavier rims for the wheels were provided.[29] Other improvements of the modern rake are cleaner teeth to prevent the hay from being carried up with the rake when it is dumped, and extra pairs of short teeth to prevent hay from rolling out at the ends of the rake.[30]

Mr. Nygard,[31] and also Mr. Nelson,[32] already mentioned, have described to the writer an interesting method of putting up hay with a bucking pole and a hay bridge, used during the 1880's and 1890's, and in some cases at a much later date. The bucking pole was the same sort as was often used to buck, or push, the straw away from a threshing machine separator. It consisted of a long stout pole with a horse hitched to either end. After the hay had been mowed and raked, this devise was used to push several haycocks at one time to

---

28. Humphries and Gray, 19.
29. Ibid., 23.
30. Ibid.
31. Interview with Mr. Knute Nygard, 622 Walnut Street, Grand Forks, North Dakota, April 21, 1949.
32. Interview with Mr. Nelson, May 24, 1949.

the spot where the hay was being stacked. When a bucking pole was to be used, the hay was often left in windrows (the long ridges of hay left by the rake) rather than bunched or pushed into haycocks. The hay bridge was a high frame with a platform on top constructed from boards, planks, and beams or heavy poles. It had one slanting side up which the hay could be pushed with the bucking pole, while the other side was perpendicular. The entire device was built on runners or skids so that it could be moved from one location to another. If the hay were to be hauled from the field a hayrack would be driven close to the perpendicular side of the hay bridge. The hay would then be bucked over the "bridge" and allowed to fall into the hayrack. Three or four bucking pole loads, (bucks) would be enough to complete a load of hay. It was a much faster way of loading hay than the method of tossing the hay directly in the hayracks from the haycocks with a pitchfork.

Much the same method was used if the hay were to be stacked in the field. The hay was simply bucked over the platform to the men who were building the stack. When the stack reached a height exceeding that of the platform, planks were placed in position with one end on the platform and the other resting on the stack, forming an inclined plane. More hay was then bucked up the inclined planks until the stack reached a considerable height. The hay bridges, being homemade contrivances could be constructed to any height which the farmer considered convenient for his purpose. The bucking pole and hay bridge have long been supplanted in the Red River Valley by such modern machines as the sweeprake, the hay stacker, and the hay loader, but many early settlers remember using them.

While the second and third decades of the twentieth century were periods of comparative stability in the development of farm implements, they were in some respects far from static. The first twenty years of the twentieth century comprised a period of preparation for the new revolutionary changes in farm machinery which were to take place in the 1920's, 1930's, and 1940's. It is true that progress in developing farm machinery was handicapped in the early twentieth century by the fact that no convenient form of power for farm field work had come into general use, other than the horse. Nevertheless this period was one of experimentation, of trial, and of increasing diversification in farming in the Valley.

As early as 1910, a definite agitation for diversified agriculture had developed in the Red River Valley. The area cultivated in wheat in proportion to the improved land area had begun to decline. This reduction in wheat acreage was followed by the rapid introduction of livestock. This in turn called for the raising of fodder crops and necessitated new types of machinery and equipment, such as corn drills, cultivators, manure spreaders, new and better fences, silos, and cream separators.[33]

The increased diversification in the Red River Valley and the consequent demand for new equipment brought a great many implement companies once more into the competitive market of the region. In

---

33. John Lee Coulter, "Industrial History of the Valley of the Red River of the North," Collections of the State Historical Society of North Dakota, Bismark, North Dakota, Tribune, State Printers and Binders, 1910, III, 666-667.

1899, the local paper of Ada, Minnesota, announced in an advertisement[34] that the De Laval cream Separator would be on exhibition in Ada, and would be operated for the benefit of all interested farmers. The company assured its prospective customers that the machine would effect a saving of at least ten dollars per cow per year. The DeLaval was to prove a famous machine in the Red River Valley and was widely used there. It was manufactured in New York and Chicago, by the DeLaval Separator Company which by 1916 claimed to have 50,000 branches and local agencies throughout the world.[35]

In 1913 a Winnipeg paper[36] advertised the Cushman engine. This was a power unit to be attached to a binder. According to the advertisement, it powered reel and sickle, and elevated, bound, and delivered the grain. The engine advertised was sold by the Cushman Motor Works of Canada at Winnipeg, Manitoba.

A local paper[37], in 1904, advertised American manure spreaders, and also John Deere Tubular cream separators. A decade later the same paper[38] was still carrying advertisements of the John Deere Separator, indicating that this machine had retained its hold in the Valley.

By 1916 the Minnesota line of machinery, including binders, mowers, and rakes, was common in the Valley. The Minnesota twine was also in common use. This Minnesota line of implements differed

---

34. Norman County Index, July 28, 1899.
35. Minnesota Farmers' Institute Annual, The Jenson Printing Company, Minneapolis, Minnesota, November 29, 1916, Cover advertisement. (Edited by A. D. Wilson, and J. M. Drew of University Farm, St. Paul, Minnesota)
36. Grain Growers Guide, Winnipeg, Manitoba, March 5, 1913.
37. Norman County Index, March 31, 1904.
38. Ibid., August 6, 1914.

from any other make used in the Valley in that it was not produced by any private corporation but by the State of Minnesota through its state prison at Stillwater. The prison inmates were employed as workmen. During the 1916 season this institution produced 22,876,395 pounds of twine, 3,812 binders, 4,799 mowers, and 3,021 rakes. The Minnesota State Prison began to manufacture twine in 1892, and farm machinery in 1908.[39]

By the middle of the second decade of the twentieth century farming in the Red River Valley of the North had become widely diversified. Perhaps no better authority for the above statement could be offered than a listing of the extensive variety of farm implements and equipment offered by the giant International Harvester Company for sale and distribution. An advertisement in the Minnesota Farmer's Institute Annual of 1916 shows that this corporation had by that time established headquarters, in the Red River Valley at Grand Forks and Fargo. The list of machinery and equipment which they presented included: Champion, Deering, McCormick, Milwaukee, Osborne and Plano harvesting, haying, and corn machines; binder twine, and tillage implements. Also offered for sale were International hay presses, hay loaders, sweep rakes and combined sweep rakes; stackers, corn planters, corn cultivators, feed grinders, and ensilage cutters. They sold also Lily and Primrose cream separators, manure spreaders, farm wagons, Mogul, and Titan kerosene tractors, and International Motor trucks.

From the above extensive list of farm implements used in the Red River Valley, it is a fair conclusion, that while farm mechanization during the first two decades of the twentieth century did not

---

39. Minnesota Farmer's Institute Annual, 1916, 294-295.
40. Ibid., 315.

move forward as rapidly as it had in the 1880's and 1890's, it had certainly undergone a mushroom expansion outwardly. The farmers of the early twentieth century knew and used a variety of machines which would have amazed their fathers of the bonanza era.

Indeed only one obstable, the lack of a really efficient and convenient internal-conbustion farm tractor, remained in the way of another tremendous spurt in farm mechanization. Even here, constant efforts were being made to clear this final hurdle. Most of these early attempts resulted in large unwieldy affairs, looking much like their predecessors, the steam engine, and catering to the popular craze for size. Nevertheless, the demand was incessant, the efforts were constant, and the publicity intense in the search for a really serviceable farm power unit for field work.

The internal-combustion engine differs from the steam engine in that in the former the force generally is applied directly to the moving parts of the engine, while in the steam engine, the power is transferred indirectly from furnace to boiler to the actual working mechanism of the engine. Because of this indirect transfer of energy in the steam engine there is more opportunity for wastage of power than in the internal-combustion type of engine.

There are several types of internal-combustion engine according to the source of power fuel which is used. These fuels include gasoline (gas), kerosene, and distillate.[41] The gasoline engine is probably the most common of these, although kerosene has frequently been used as a fuel, while of late years especially, distillate is becoming popular. The operating principle of all of these types is the same.

---

41. Davidson and Chase, 401.

While many men have contributed to the building of the internal-combustion engine, none have been of more note than two young engineers, C. W. Hart, and C. H. Parr of Charles City, Iowa. These two men are sometimes known as the parents of the internal-combustion tractor. They built their first tractor in 1901. It was a cumbersome, two-cylindered, oil-cooled, slow-speed, two-cycled affair. It astonished surrounding farmers, and manufacturers alike for a somewhat unique reason-It worked![42] The new Hart-Parr became the leading tractor product on the market until 1910, when it was overtaken by the International Harvester Company tractor output.[43] The Hart-Parr was used in the Red River Valley from 1912 to 1920 as were also the Titan, the Mogul, and the Avery.

It was not the Red River Valley, however, which stimulated the development of the tractor industry, but the new lands of western Canada. In 1906, when these lands were being repidly developed, the tractor industry may be said to have received its first great impetus.[44]

Canada was the great tractor market of the early tractor days (1906-15) and the City of Winnipeg in the Northern Red River Valley was the headquarters for great tractor plowing demonstrations in 1908, 1909, and 1910.[45] Steam engines contested with gasoline engines and by 1910 the gasoline tractor was triumphant. In 1910, also, appeared the first tractors using kerosene as a fuel. This

---

42. McCormick, 155.
43. Ibid., 157.
44. Ibid., 155.
45. Ibid., 156-157.

latter fuel was to be a serious rival of gasoline. Three famous kerosene burning tractors appeared on the scene; the Mogul, and Titan by International Harvester, and the Rumely Oil Pull, known as "kerosene Annie." Nearly all of these tractors were huge. A favorite stunt of the International Harvester Company was to hook three sixty-horse-power monsters, weighing eleven tons each, together, attach fifty-five plows, and plow a strip of land sixty-four feet wide.[46]

The large tractors could pull a good many plow bottoms and turn over a lot of land in a day. This was all very well for the vast farms of the Canadian West. It was the manner in which these Western Canadians wanted their land plowed. On the other hand, American farms were smaller than the vast holdings of Saskatchewan and Alberta.[47] In the Red River Valley the day of the giant bonanza had passed. Even in the 1870's, and 1880's, there had always been many homesteads for every great bonanza. By 1910, the few bonanza estates had been broken up into smaller holdings. Thus in the United States a demand for a smaller size in tractor construction was making itself felt.

The first light tractor was produced by the Bull Tractor Company which in 1913 turned out the Little Bull Tractor, and in 1914 followed with a slightly larger machine, the Big Bull Tractor. These machines were quite popular for a few years, but apparently were not too well built as they did not continue in favor.

---

46. McCormick, 158.
47. Ibid., 159-160.

The Mogul 8-16 (eight horsepower at the drawbar and sixteen at the belt pulley) was another light tractor of the 1810's. Its companion tractor, the Titan 10-20, was brought out at about the same time.[48] The Rumely firm sold a good many tractors in the Red River Valley and in Canada, but the company failed in 1914, largely because of Canadian crop failures.[49] Many other small tractors begin to appear on the market during the second decade of the twentieth century. Many small tractor companies, however, could not meet the competition of the giant corporations with their vast resources, and were obliged to pass out of the picture. The Bull Tractor Company was one of these.[50]

Tractor farming became the order of the day. Production was greatly stimulated by World War I, but because of European demands for machines, many tractors were diverted from American farms. By 1918, International Harvester, Case, Avery, and Moline were the leading producers of tractors.[51] By 1920 tractor farming on American farms was in full swing.

In spite of the fact that tractors were certainly used on American farms during the first two decades of the twentieth century the farm work animal continued to be the chief source of power during this period. In 1910, there were 19,833,000 horses and 4,210,000 mules on American farms, while in 1920, 20,785,000 horses and 5,041,000 mules were listed.[52] This shows an actual increase in both catagories of work animals in the country as a whole. While

---

48. McCormick, 160.
49. Ibid., 159.
50. Ibid., 161.
51. Ibid.
52. Statistical Abstract of the United States, 1920, Washington, D.C., Government Printing Office, 1921, Vol. 43, 171.

the Red River Valley was certainly better suited to tractor farming than many sections of the East and South, there is evidence that in the former region also, the big increase in use of tractors came in the decade of the 1920's. In 1920, 14,794 Minnesota and 11,834 North Dakota farms reported the use of tractors,[53] while in 1930, 46,171 Minnesota and 34,148 North Dakota farms employed one or more of these machines.[54] Inasmuch as the Red River Valley has always been a strong farming region, the figures given above are indicative of the use of tractor power there.

Not classed as a farm implement but certainly of paramount importance in the life of every farm community is the automobile. Side by side with rural free delivery and the telephone, the motor car transformed the life of the farmer, and of the farmers wife and family, from rural isolation to world citizenship. Later this triumvirate would be joined by a sensational younger brother, the radio. No one who has not made the long ride to town riding the grain box of a creaking wagon can realize what it meant to the farmer to have his grain carried by motor truck directly from threshing machine to grain elevator. No one who has not waited anquished hours with a farm mother by the bedside of a sick child can imagine the blessing of telephone and automobile in summoning quickly and obtaining promptly the services of a doctor. No one who has not waited by a country mail box for the carrier's chugging Ford, Reo, or Maxwell can visualize the delight of daily mail to the farm lands. That mail might contain letters essential to business

---

53. Statistical Abstract, 1930, Vol. 52, 647.
54. Ibid., 1940, Vol. 62, 662.

or pleasure. It might contain the Country Gentleman, the Youth's Companion, Farm, Stock, and Home, or, bless it, the farmer's Bible, the great Montgomery Ward Catalog.

In the Red River Valley as elsewhere, the farm people waited with keen interest for any news of automobile advancement, and learned during the second decade of the twentieth century to know by sound and sight the Reo, the Ford, the Overland, the Chevrolet, the Maxwell, and many another make of car.

In the possession of Mr. Ansgorde Haaland[55] of Ada, Minnesota is a very interesting collection of farm papers, farm magazines, mechanical trade journals, and old catalogs collected over a period of some fifty years. Included among these is a copy of the Motor World[56] for December of 1900.

Appearing in the above mentioned copy of the Motor World is an article advertising the product of Grout Brothers of Orange, Massachusetts. This firm produced a steam car which was declared to be "built for business and built fool proof." It was a buggy-like vehicle with high wheels (the rear wheels were thirty inches in diameter), and was steered from the center with a steering lever, instead of a steering wheel.[57] The Electric Vehicle company of New York, and Hartford, Connecticut manufactured both gasoline and electric automobiles,[58] while the Triumth Motor Vehicle company of

---

55. Mr. Ansgorde Haaland of Ada, Minnesota, an oldtime resident of the Red River Valley, is a neighbor of the writer, and kindly lent him a portion of his collection.
56. The Motor World, New York, December 13, 1900.
57. Ibid.
58. Ibid.

Chicago, Illinois, made electric, steam, and gasoline cars.[59]

Interesting items in the same paper state that Columbia College had a professor of automobilism, and Brigadier-General Greely was shipping a motor vehicle to the Philippines for the use of the Signal corps.[60]

The automobile was not indigenous to the Red River Valley. In fact, George Seldom, Rochester, New York, had experimented with gasoline automobiles as early as 1879. The genius of Charles Duryea, and the industry of Henry Ford brought the automobile to the American people. By 1920 Ford was making over six thousand cars a day in his Detroit plant.[61] Nevertheless, the coming of motor vehicles to the Valley had profound effects, both economically and socially. The Red River farming region produced heavy products such as grain and livestock which were marketed to a considerable extent by truck after the coming of the automobile. Trucks, however, are hard on roads. The level surface of the Valley made construction of roads, paved or surfaced, comparatively easy, and this in turn created a market for still more motor vehicles. The Valley farmer today can easily drive fifty or sixty miles to secure or replace a broken piece of equipment, thus saving precious time in busy work seasons. The farmer's husky son thinks even less of putting in a ten hour work day and then hopping into his father's, or in many cases his own, car and driving fifty miles to a dance.

In conclusion, it may be stated, that while the motor vehicle is not strictly speaking, farm machinery, yet it is an extremely

---

59. Motor World, December 13, 1900.
60. Ibid.
61. Samuel Eliot Marison and Henry Steel Commager, The Growth of the American Republic, New York, Oxford University Press, 1942, 2 Vols., II, 127.

important complement of farm equipment. Certainly no consideration of farm mechanization today can afford to disregard the farm car and farm truck.

As was the case with tractors, cars and trucks probably did not reach a stage of great commercial importance in the Red River Valley until the 1920's, although certainly any middle-aged resident of the Valley can recall a number of Model-T Fords and other makes well before that date. Pleasure cars were more prevalent on Valley farms than were trucks by a considerable ratio. In 1920, 101,847 Minnesota farms possessed cars while only 3,667 farms were listed as possessing trucks. North Dakota in the same year, had 44,010 farms possessing cars, but only 743 farms reported as using trucks.[62] By 1930, 159,372 Minnesota and 67,496 North Dakota farms possessed cars, while 35,503 Minnesota, and 16,502 North Dakota farms had farm trucks.[63] A significant point to note is the surprising increase in trucks in North Dakota, which by 1930 had approximately half as many on the farm as did Minnesota with much less than half the population. In part, this reflects the greater portion of North Dakota citizens who were farmers, and, more significant, the proportion who farmed on a large enough scale to need trucks.

A survey of conditions existing in the Red River Valley of the North in the early 1900's make very apparent the reasons for the diversification of agriculture, and hence of farm machinery, which is the outstanding characteristic of the mechanization of farm machinery during the first two decades of the twentieth century. Wheat, which had been without a rival among farm crops along the

---

62. Statistical Abstract, 1930, 647.
63. Statistical Abstract, 1940, 662-663.

Red River in the last twenty-five years of the nineteenth century had come to take its toll of the soil. Weeds had established themselves in the depleted soil and proved an enemy which cost the farmer much time and labor to combat. The wheat yield per acre was decreasing and the quality of the seed declining.[64] By 1900, about fifty percent of the cultivated land was in wheat, whereas a few years before about seventy-five per cent had been so planted.[65]

The farmer realized that he must diversify, but frequently he did not have the capital to do so. His other alternative was to sell his land and move to newer lands farther West.

When the Valley farmer sold his land, it was frequently to a person from the corn and livestock districts of the country. These people had necessarily practised a much greater diversification in farming than the Valley people whom they bought out, and the newcomers brought these farming methods with them.[66] Timothy, clover, pasture, corn, barley and millet acreage increased, with a consequent great increase in dairy cattle. The number of creameries in the Valley increased on the Minnesota side from fifteen in 1901 to fifty-four in 1907. On the Dakota side of the River a like movement took place.[67]

With the addition of the livestock industry to the basic grain industry, many new types of machinery became immediately essential to farming operations in the Valley. These were, principally: an

---

64. Coulter, 649.
65. Ibid., 650.
66. Ibid., 651.
67. Ibid., 652.

entire series of haying implements, cream separators, manure spreaders, corn planters, cultivators, ensilage cutters, and corn binders. Diversification, once started, gathered speed like a snowball rolling down hill on a warm winter day, and Valley diversification took place with a vengeance. The Valley by 1920 it is true was still a great grain growing region. Its farms were still comparatively large and still required machines of large size for their cultivation. Nevertheless, to the basic staple, wheat, had been added such crops as corn, hay, potatoes, and flax. Dairying and poultry raising were both practiced on a large scale prior to World War I. Thus the period of the first two decades of the twentieth century brought to the Valley an era of varied agriculture and of diversified mechanization of farm machinery.

CHAPTER V

RECENT TRENDS

The mechanization of the Red River Valley of the North was a process unbroken in its continuity. Nowhere was there a dividing line where it might be said that in this year men used the reaper and the next year employed the binder, or that at one time farmers used the threshing outfit, discarded it, and thereafter harvested their crops with the combine. Rather, one man in 1912 might plow his fields with a gang plow and a six horse team, while his neighbor chugged over his acres with a Rumely Oil Pull. In 1925 a giant steam threshing outfit might well be operating in one field, while across the road a Wallace Cub tractor and 22-inch separator were being used to accomplish the same task. The machines of 1920 were very different from the implements of 1890, but they were not so very unlike their predecessors of 1910 and had much similarity to their successors of 1930. The machines of one period did not give way at once to younger rivals. They tested the strength of the newcomers well before themselves passing to their rusty rest in weed patch or scrapheap. So the 1870's, 1880's and 1890's faded into a new century, and the early decades of the 1900's flowed smoothly into the 1930's and 1940's. These last years, the decades of the present era, are nothing more than the accomplishments and achievements of the early years of the nineteenth century made fat with the trials, the failures, the plans, and the successes of the decades which passed before them.

While the farm mechanization of the last thirty-five years has been a continuation of the progress of the past resting on a

solid base of the achievements of those years, there have been several significant movements which have become plainly distinguishable. Included among these trends have been the final triumph of the tractor over the horse as the basis of farm power, the transition of harvest and threshing operations to a combined process, the adoption of rubber tires for farm implements, the growing rural electrification, the increasing use of motor vehicles, and the vastly increased expenditures made necessary by farm mechanization. Nowhere, perhaps, have these trends of agricultural mechanization been better illustrated than in the extensive drainage basin of the Red River of the North.

With the coming of the small and moderate sized internal-combustion tractor, the day of the horse as the basic unit of farm power was destined to pass. The horse has not passed out of existence by any means. The farm animal as a work unit is still used for odd jobs on many farms and quite extensively on farms of small size-a quarter section or less. Nevertheless, in the six years from 1923 to 1929, tractors on American farms nearly doubled in number. During this period 400,000 tractors displaced 4,250,000 horses. Between 1929 and 1942 horses were reduced from 20,000,000 to 14,000,000 by the introduction of 840,000 additional tractors.[1] Even by 1940, however, tractors still cost too much to operate on very small farms; a factor which served to slow down complete

---

1. Farm Power and the Post War Tractor, Remarks by L. B. Sperry Manager of Engineering, Farm Tractor Division, International Harvester Company, before the Chicago section of the Society of Locomotive Engineers, at Knickerbocker Hotel, Chicago, Illinois, February 8, 1944, International Harvester Company, Chicago, Illinois, 1944, 17. Hereafter this source will be cited as Sperry.

mechanization of farming. This condition was much more a characteristic of the small farm regions of the eastern United States than in the West North Central States, of which the Red River Valley is typical. In New England, for instance, there were, in 1940, only 1,500 farms of over 500 acres, while in the West North Central States there were 95,000 such farms.[2] These do not present a complete picture since a farm of 500 acres in New England is considered extremely large, while in the Red River Valley it is not at all exceptional.

Tractor farming has not achieved its ultimate goal. It has not replaced the horse entirely, and perhaps it will never accomplish this. There were in the United States, in 1944, one and one-quarter million farms of between twenty and fifty acres, and not many of these produced enough income to afford a tractor. Many of these small farms were in the South, but even in the great corn and grain belts there were still two farms for each tractor and more than one team of horses for each farm.[3]

In the Red River Valley of the North, with its big grain-farm agricultural base, the tractor has been much more a success than in the country, as a whole. During the last thirty years a tractor of a size and convenience capable of displacing horses for most kinds of work in any farm of a quarter section or more has been developed. To cope with the increased diversification of the area, machinery especially designed for tractors has also been developed. Tractor plows, tractor harrows and tractor cultivators are a part

---

2. Sperry, 19.
3. Ibid., 20.

of the equipment of any reasonably modern farm today. This may be ascertained by visiting at random practically any farm within an hours drive of Grand Forks, North Dakota. This development of the tractor has not been accomplished without the continuous work and constant contributions of many men and many companies. Among the concerns who have contributed their efforts and advertised their machines to the public are Hart-Parr, now the Oliver, the Moline Universal, now Minneapolis-Moline, Waterloo Boy, now John Deere, J. I. Case, and Holt Manufacturing Company, now Caterpillar. In 1917, Henry Ford began producing a small, compact, moderately priced tractor, the famous Fordson. Whatever the faults or merits of this machine, there is no doubt that it spurred the efforts of other companies to produce a small, light tractor also.[4] With the coming of this light weight, family-sized tractor, a great Agricultural movement was accomplished in the Valley--the replacement of the horse as a base of farm power.

A romatic feature of the last three decades of agriculture in the Red River Valley has been the rise of the combine. In the latter 1800's and in the first twenty years of this century, the big threshing outfit, large-size separator and huge steamer, were lords of the harvest field. By 1920 the light internal-combustion tractor and small-sized separator appeared on the field. This new threshing unit proved a David that almost annihibated the older Goliah of the wheatlands. Shortly thereafter, however, an antagonist new to the Valley entered the scene.[5] Before this new contestant, the combine,

---

4. William H. Kircher, "Power for Farming," The Farmer, St. Paul, Minnesota, April 2, 1949, 16.
5. William H. Kircher, "Seeding and Reaping," The Farmer, St. Paul, Minnesota, April 2, 1949, 70.

both the big steam outfit and the smaller, tractor-powered threshing unit were destined to gradually give way. The great steam-powered threshing machine has almost entirely disappeared, while the tractor-small separator combination has been reduced to a few remaining strongholds.

Combines were produced in California as early as 1860, and by 1900 there were several makes used in the fields of the western portion of the country. Most of these machines were very large and required either a big steam engine or from thirty-two to forty horses or mules for power.[6] These monster combines could cut a swath of grain from twenty-five to forty feet in width.[7] A small combine cutting a seven foot swath was manufactured about 1905 and light weight combines were on the market by 1915.[8] The real adaptation of combines to farms of smaller size followed shortly after World War I, while the most recent change, the self-propelled combine, has been introduced since World War II.[9]

In examining the ascendency of the combine over the various types of older threshing outfits, several advantages become apparent. The combine accomplishes in one operation what was formely done by the two processes of harvesting and threshing. Consequently a great saving of time takes place.[10] A striking advantage achieved by the combine is the saving of labor. A crew of three men

---

6. Kircher, "Seeding and Reaping," 70.
7. Lillian Church, Partial History of the Development of Grain Harvesting Equipment, Information Series No. 72, Washington, D.C., Government Printing Office, 1947 (Revised), 50.
8. Ibid.
9. Kircher, "Seeding and Reaping," 70.
10. In the Red River Valley a separate machine, the swather, is generally employed to cut the grain and lay it on the stubble, after which it is picked up and threshed by the combine. In this case, some of the time saving advantage is lost.

can now accomplish in a shorter time the same amount of work that with the threshing machine required a crew of twenty or more men. The horses needed for bundle teams for a threshing rig and the twine required for binding grain with a binder are also dispensed with if a combine is employed. The farmer no longer needs to join forces with his neighbor to form a threshing crew, as the modern small combine is strictly a one farm implement. Several advantages, however, are still advanced for the threshing machine. Many farmers claim that the threshing machine process preserves the quality of the grain better than is the case in combining. A definite advantage of the older method is that it is far easier to secure straw for bedding or fodder.[11] It is probably true that combining scatters weed seeds more than is the case with the older type threshing unit.

Advertised in the Minnesota Farmer's Institute Annual of 1916 were a large number of farm implements. Among these were the Happy Farmer Tractor, produced by the La Crosse Tractor Company of Minneapolis, Minnesota. The Waterloo Boy Kerosene Tractor, a product of the Waterloo Gasoline Engine Company of Waterloo, Iowa, The International Harvester Company's Titan 10-20, and the Huber "Light Four," manufactured by the Huber Manufacturing Company of Marion, Ohio.[12] A glance at the illustrations of these machines shows a great variety of build and design, but all four tractors had one feature in common. All were equipped with steel wheels.

---

11. This point is debatable if the straw-spreading attachment is removed from the combine and the modern pick-up hay-bailer employed.

12. Minnesota Farmer's Institute Annual, St. Paul, Minnesota, (Edited by A. D. Wilson and J. M. Drew) The Jenson Printing Company, Minneapolis, Minnesota, November 29, 1916, 253-265-281-297.

Pictured among the advertisements appearing in a 1949 issue of The Farmer[13] are the International Harvester Company's Farmall tractor, and tractors manufactured by the Allis-Chalmers, Case, and Oliver companies. Again, in spite of a number of variations, one striking similarity appears. All four machines are rubber-tired.

The conclusion that an important change, the mounting of farm implements on rubber tires, has developed sometime between 1916 and 1949 is clear. Today the rubber-tired tractor is a common sight on Red River Valley farms. There are several reasons why this transition has taken place. One cause is the growth of the rubber industry itself. In 1900 this country imported 27,000 tons of rubber while today it imports one and one-half million tons.[14] The improvement of tires has been steadily progressing. The early type fabric tire, which would go to pieces after 2500 to 3000 miles of use, was replaced by the much better cord tire. In 1923 the first balloon tires were introduced, and in 1930 the so-called air wheel, which allowed a reduction in air pressure was first produced. The even larger tire of today permits a further reduction in pressure, a factor which adds greatly to riding comfort.[15]

Less than twenty years ago the first tractor to be put on rubber wheels was used in a Florida citrus grove. It was equipped with tires taken from an airplane. Tests were conducted which proved that the rubber-tired tractor consumes only three-fourths as much fuel as an identical model mounted on steel wheels, and that

---

13. The Farmer, inside cover, 7-17-37.
14. William H. Kircher, "Rolling on Rubber," The Farmer, St. Paul, Minnesota, April 2, 1949, 28.
15. Ibid.

the rubber-tired tractor has 29.1% more power at the drawbar.[16]

Once it had proven itself, the rubber-tired tractor gained rapidly in popularity. Today it is to be seen throughout the Red River Valley. In the Valley at the present time the rubber-tired tractor and the rubber-tired implements which it pulls are a firmly established part of farm mechanization.

Of course, this increased mechanization of farming has been accompanied by vastly increased expenditures. The value of farm implements and machinery for Minnesota in 1890 was $16,916,473; in 1900, $30,099, 230; in 1910, $52,329,165. For North Dakota during the same period farm implements and machinery were valued at $6,648,180 in 1890; $14,055,560 in 1900; and $43,907,595 in 1910.[17] In 1939 93,805 Minnesota farms reported an expenditure for farm implements and machinery of $34,258,000, and North Dakota expenditures for the same year were $14,171,000 with 36,591 farms reporting.[18] Thus it will be seen that the expenditures for the one year of 1939 was over one-half of the entire accumulated value of farm implements and machinery for Minnesota, in 1910 while North Dakota expenditures for the same year were about one-third of the total accumulated value for 1910.

The value of farm machinery in Grand Forks County, a typical county in the heart of the Red River Valley, in 1900 was $872,400; in 1910, $1,776,511; in 1920, $3,988,327; and in 1930, $2,909,496.[19]

---

16. William H. Kircher, "Rolling on Rubber," 28.
17. Statistical Abstract of the United States, Washington, D.C., Government Printing Office, 1920, 43rd Number 139.
18. Statistical Abstract, 1946, 67th Number, 614.
19. Red River Drainage Basin North Dakota, Wapeton, North Dakota, E. D. Lum, 1939, 60 (Report by State Planning Board and Works Progress Administration.)

Here a surprising fact appears; the drop in values from 1920 to 1930. It should, however, be recalled that in 1930 the country was in the middle of a very serious depression, and that the money values expressed do not reflect an accurate picture of the machinery requirements of farmers. In fact, for some years the plight of the farmers had been acute and few possessed the money to invest in new and needed machinery, hence the decline in value of farm implements. With the passing of the depression and the rise in farm prices, the increased expenditures for farm implements were again resumed. North Dakota farm expenditures for 1930 were $118,744,000, while Minnesota farmers spent $181,767,000 for this purpose.[20] In 1940 North Dakota expenditures dropped to $76,876,000 but showed a tremendous increase to $161,531,000 in 1945. The figures for Minnesota were $193,444,000 in 1940, and $303,430,000 in 1945.[21]

Two other trends in farm mechanization in the Valley were both sharply interrupted by World War II. They were the increased use of motor vehicles, and the growth of rural electrification. The needs of a "total" war turned the big car and tractor corporations to the manufacture of army trucks, jeeps, tanks, and planes, while the work of the Rural Electrification Administration, the only systematic proceedure for farm electrification, was also suppended during that conflict. During the four years since "V-J" day both trends have again become apparent. The movement for motorizing the farms of the Valley may soon reach its peak, but rural electrification seems destined to play an extremely important part in the

---

20. Statistical Abstract, 1940, 62nd No., 641.
21. Statistical Abstract, 1947, 68th Edition, 587.

Valley farmlands of the future.

The complete story of the Mechanization of the Red River Valley of the North reaches back to the dim prehistoric day of the first planter, while its future telling lies in the hands of the posterity of its present inhibitants. When the settlers of the 1870's and 1880's spread up and down the bed of old Lake Agassiz, they came equipped with the strength and wisdom of men who never saw the Valley. Jethro Tull in his English homestead was among these men, and Thomas Jefferson, the farmer of Monticello, and many another known and unknown worker as well.

The men of the 1870's and 1880's came supplied with courage, too, with ambition to achieve, and the will to make homes. So they used the scythe and cradle when they had no better tool, but very soon the reaper and the gang plow were employed. The early decades passed, and with the new century came the giant steamer, the many-bottomed plow, the dairy barn, and poultry yard.

Wheat was the first king, but when, like most monarchs, he robbed the hopes of his subjects, the settlers decreed that he should no longer rule supreme. Many crops were planted during the first score of years of the twentieth century. Many machines of new and varied types were needed. In the 1920's and 1930's the small tractor spread power broadcast over the Valley, while the combine displaced his rival, the engine and separator threshing unit.

The beginning of the story goes back to ancient days, the end lies in the future, but the heart of the great tale of machines in the Valley was surely in the forty-five years of peaceful effort from 1870 to 1915. A few scant years before this period a bloody

Civil War was fought. At the end of the eventful decades of progress, a world wide war was raging, to be followed by a deadening depression, and then a second greater conflict of global fury. But during the decades of peace, scarely stirred by the brief rumble of the Spanish war, the men of the Valley, worked, planned, and achieved, calling ever newer and better machines to their aid. As they worked with steam, and steel, and gasoline, and rubber, they built the sentences, compounded the paragraphs, and composed the chapters of a new and stirring romance; the mechanization of the farmlands of the fertile Red River Valley of the North.

BIBLIOGRAPHY

INTERVIEWS

Interview with Mr. Joe Goeller, Valley City, North Dakota, July 13, 1949.

Interview with Mr. Joe Johnson, Ada, Minnesota, July 16, 1949.

Interview with Mr. Lars Larson, 422 Walnut, Grand Forks, North Dakota, April 21, 1949.

Interview with Mr. N. N. Nelson, 1004 Cottonwood, Grand Forks, North Dakota, May 24, 1949.

Interview with Mr. Knute Nygard, 622 Walnut, Grand Forks, North Dakota, April 21, 1949.

Interview with Mr. Knute Nygard, 622 Walnut, Grand Forks, North Dakota, June 27, 1949.

Interview with Mr. Comart Peterson, Tolley, North Dakota, July 10, 1949.

Interview with Mr. Carl Riboski, 205 North Fourth Street, East Grand Forks, Minnesota, June 28, 1949.

FEDERAL DOCUMENTS

Statistical Abstract of the United States, 1904, Department of Commerce and Labor, Washington, D.C., Government Printing Office, 27th number, 1905.

Statistical Abstract of the United States, 1910, Department of Commerce and Labor, Washington, D.C., Government Printing Office, 33rd number, 1911.

Statistical Abstract of the United States, 1920, Department of Commerce, Washington, D.C., Government Printing Office, 43rd number, 1921.

Statistical Abstract of the United States, 1930, Department of Commerce, Washington, D.C., Government Printing Office, 52nd number, 1930.

Statistical Abstract of the United States, 1940, Department of Commerce, Washington, D.C., Government Printing Office, 62nd number, 1941.

Statistical Abstract of the United States, 1942, Department of Commerce, Washington, D.C., Government Printing Office, 64th number, 1943.

Statistical Abstract of the United States, 1946, Department of Commerce, Washington, D.C., Government Printing Office, 67th number, 1946.

Statistical Abstract of the United States, 1947, Department of Commerce, Washington, D.C., Government Printing Office, 68th number, 1947.

United States Census of Agriculture, 1935, Department of Commerce, Bureau of the Census, Washington, D.C., Government Printing Office, 3 vols. I, 1936.

Fifteenth Census of the United States, Agriculture, 1930, Department of Commerce, Bureau of the Census, Washington, D.C., Government Printing Office, 4 vols.,II, Part I, 1932.

Report of Federal Trade Commission on Causes of High Prices of Farm Implements, Washington, D.C., Government Printing Office, 1926.

IMPLEMENT COMPANY PAMPHLETS

International Harvester Company, McCormick Reaper Centennial Source Material, Chicago, 1931.

Farm Power and the Post-War Tractor, Remarks by L. B. Sperry, Manager of Engineering, Farm Tractor Division, International Harvester Company, before the Chicago Section of the Society of Locomotive Engineers, at Knickerbocker Hotel, Chicago, Illinois, February 8, 1944, International Harvester Company, Chicago, Illinois, 1944.

J. I. Case Threshing Machine Company, Case Wood Engravings, Reminder of a Lost Art, St. Paul, Minnesota, 1942.

J. I. Case Threshing Machine Company, The Case Catalog, Racine, Wisconsin, 1904.

NEWSPAPERS

Grand Forks Plain Dealer, Grand Forks, North Dakota, 1882-1898.

Norman County Index, Ada, Minnesota, 1883-1914.

Grain Growers' Guide, Winnipeg, Manitoba, 1909-1913.

MAGAZINES AND PERIODICALS

Kircher, William H., "Power for Farming," The Farmer, St. Paul, Minnesota, April 2, 1949.

Kircher, William H., "Breaking the Good Earth," The Farmer, St. Paul, Minnesota, April 2, 1949.

Kircher, William H., "Rolling on Rubber," The Farmer, St. Paul, Minnesota, April 2, 1949.

The Motor World, New York, December 13, 1900.

Minnesota Farmer's Institute Annual, Minneapolis, November 29, 1916.

DEPARTMENT OF AGRICULTURE PUBLICATIONS

Church, Lillian, Corn Planters and Grain Drills, Information Series No. 59, United States Department of Agriculture, Washington, D.C., Government Printing Office, 1935.

Church, Lillian, History of the Plow, Information Series No. 48, United States Department of Agriculture, Washington, D.C., Government Printing Office, 1935 (revised).

Church, Lillian, Partial History of the Development of Grain Threshing Implements and Machines, Information Series No. 73, United States Department of Agriculture, Washington, D.C., Government Printing Office, 1929.

Church, Lillian, Partial History of the Development of Grain Harvesting Equipment, Information Series No. 72, Department of Agriculture, Washington, D.C., Government Printing Office, 1947 (revised).

Church, Lillian, History of Grain Drills, Information Series No. 70, United States Department of Agriculture, Washington, D.C., Government Printing Office, 1935.

Humphries, W. R. and Gray, R. B., Partial History of Haying Equipment, Information Series No. 74, United States Department of Agriculture, Washington, D.C., Government Printing Office, 1944.

Holmes, George K., "Progress of Agriculture in the United States," United States Department of Agriculture Yearbook, 1899, Washington, D.C., Government Printing Office, 1900.

BOOKS

Bidwell, Percy W., and Falconer, John I., History of Agriculture in the Northern United States 1620-1860, New York, Peter Smith, 1941 (Reprinted with the permission of the Carnegie Institution of Washington).

Coulter, John L., "Industrial History of the Red River of the North," Collections of the State Historical Society of North Dakota, Bismark, Tribune, State Printers and Binders, 7 Vols., III, 1910.

Davidson, Brownlee J. and Chase, Leon W., Farm Machinery and Farm Motors, New York and London, Orange Judd Company, 1908.

Encyclopedia Britannica, "Deere, John," New York, Encyclopedia Britannica Incorporated, 24 Vols., VII (author not listed)

Hutchinson, William T., Cyrus Hall McCormick, New York and London, D. Appleton-Century Company Inc., 2 Vols., 1935.

Lamphere, George N., "History of Wheat Raising in the Red River Valley," Collections of the Minnesota Historical Society, St. Paul, Minnesota Historical Society, 17 Vols., X, Part I, 1905.

McCormick, Cyrus, The Century of the Reaper, Boston and New York, Houghton Mifflin Company, 1931.

McGrew, Paul O., "Lake Agassiz," The World Book, Chicago, Quarrie Corporation, 19 Vols., I, 1946.

Mittman, Carl W., "Jerome Increase Case," Dictionary of American Biography, New York, Charles Scribner's Sons, 21 Vols., III, 1929.

Morison, Samuel E. and Commager, Henry S., The Growth of the American Republic, New York, Oxford University Press, 2 Vols. II, 1942.

Who Was Who in America, "Deere, Charles Henry," Chicago, A. N. Marquis Company. This is the initial volume of the set. The second volume will probably be issued in 1953.

STATE PLANNING BOARD AND WORKS PROGRESS ADMINISTRATION PROJECT

Report by State Planning Board and Works Progress Administration, Operation No. 665-73-3-67, Red River Drainage Basin, North Dakota, Wapeton, North Dakota, F. D. Lum, 1939.

APPENDIX I

Value of Farm Implements and Machinery in Eight Red River Valley Counties

State	Year	Marshall	Norman	Clay	Polk
	1920	$3,421,437	$2,516,923	$3,131,745	$5,115,926
Minnesota	1925	1,985,905	1,740,766	2,306,801	3,469,527
	1930	1,906,433	1,902,683	2,419,418	4,035,292

State	Year	Cass	Richland	Grand Forks	Pembina
	1920	$5,214,657	$3,925,335	$3,988,327	$3,241,422
North Dakota	1925	3,896,823	2,887,695	2,659,308	2,035,105
	1930	4,461,184	3,693,864	2,909,496	2,416,651

The above data is from the Fifteenth Census of the United States 1930 Agriculture, Volume II, Part I, United States Department of Commerce, Washington, D.C., Government Printing Office, 1932, 819-820-821.

APPENDIX II

Numbers of Various Types of Machinery in the United States

Kind of Machinery

Grain Binders, Harvesters and Headers

1869	1879	1889	1899	1904	1909	1914
3,566	25,737	125,942	233,542	108,810	129,274	215,386

Mowers

1869	1879	1889	1899	1904	1909	1914
99,131	120,010	186,574	398,616	273,385	359,244	274,522

Threshers and Separators Combined

1869	1879	1889	1899	1904	1909	1914
22,931	10,424	2,661	3,651	7,950	12,957	13,296

Threshers

1889	1899	1904	1909	1914
2,769	1,314	2,237	922	302

Sulky plows

1889	1899	1904	1909	1914
67,286	136,175	138,899	134,936	108,232

Walking Plows

1869	1879	1889	1899	1904	1909	1914
864,961	1,326,123	1,182,059	819,122	956,898	1,110,006	870,414

Manure Spreaders

1879	1899	1904
8,155	5,263	22,236

Wheeled Cultivators

1889	1899	1904	1909	1914
286,482	295,799	313,088	435,429	378,934

Above data is from Report of Federal Trade Commission on Causes of High Prices of Farm Implements, Washington, D.C., Government Office, 1920, 44.

APPENDIX III

Average Size of Farms in Ten North Dakota Counties in and Adjoining the Red River Valley

County	1900	1910	1920	1925	1930	1935
Barnes	445	518	443	424	431	408
Trail	427.1	459.7	409.5	388.5	364.1	343.1
Cass	469.7	494	420	404.5	408.7	407.6
Cavalier	266.9	424.2	439.9	412.9	446	417.9
Pembina	311.1	396	356.7	348	357.3	318.2
Steele	444	487.3	438	427	442	400.3
Grand Forks	363.9	431.5	408.2	371.2	394.6	351.5
Griggs	428	506	443	421	464	406
Walsh	292.8	348.3	335.1	312.3	318	302.9
Nelson	356.8	486.9	485.9	444.9	520.4	424.8

The above data is from the Report by State Planning Board and Works Progress Administration, Operation Project No. 665-73-3-67, Red River Drainage Basin North Dakota, Wapeton, F. D. Lum, 1939, 56.

APPENDIX IV

Estimate of Machinery Required to Operate a Red River Valley Farm of 320 acres in 1915

1 Binder	$ 225.00
1 Hayrake	75.00
1 Mower	80.00
2 Gang plows	250.00
3 Wagons equipped with wagon boxes or hayracks	450.00
1 Drill	250.00
1 Harrow	70.00
1 Cultivator	90.00
1 Corn Planter	125.00
1 Corn Binder	175.00
1 Disk	100.00
Plus ten horses for power	1000.00
Total cost	$2890.00

If the above sum is increased to $3500.00 to allow for miscellaneous machinery and equipment, a total estimate of the machinery and power required to operate a farm of 320 acres in 1915 is arrived at.

The above estimate was made by Mr. Joe Goelier, a Valley City, North Dakota, farmer, and was checked by Mr. Joe Johnson, farm implement dealer, of Ada, Minnesota.

APPENDIX V

Estimate of Machinery Required to Operate a Modern Red River Valley Farm of 320 Acres

1 Combine	$1800.00
1 Swather	650.00
1 Drill	600.00
1 Tractor	1800.00
1 Plow	250.00
1 Harrow	150.00
1 Disk	275.00
1 Mower	175.00
1 Side delivery rake	200.00
1 Digger	350.00
1 Disk Plow	450.00
1 Cultivator	225.00
1 Corn Planter	300.00
1 Corn Cutter	750.00
1 Potato planter	200.00
1 Potato digger	750.00
1 Truck	2000.00
1 Grain elevator	350.00
2 Trailors	400.00
Miscellaneous equipment	2325.00
Total Cost	$14,000.00

The above estimate was made by Mr. Goeller and checked by Mr. Johnson.

APPENDIX VI

Estimate of Machinery Required to Operate A Modern Twelve Hundred Acre Red River Valley Farm

2 Tractors	$ 4000.00
1 Sprayer	300.00
2 Trucks	4300.00
2 One way disk	600.00
1 Drill	600.00
1 Press Drill	600.00
1 Self-propelled combine	4000.00
1 Harrow	150.00
1 Tandem disk	250.00
1 Swather	650.00
1 Car	2300.00
1 Packer	180.00
2 Cultivators	900.00
1 Mower	250.00
1 Side-delivery rake	250.00
1 Rod weeder	250.00
2 Fuel Tanks	100.00
1 Corn planter	180.00
Miscellaneous equipment and machinery	2000.00
Total	$21,860.00

The above estimate is by Mr. Comart Peterson, a farmer of Tolley, North Dakota, and has been checked by Mr. Joe Johnson of Ada, implement dealer, handling the Case line of Farm Machinery.