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COAL SMOKE AND VALVE OIL: THE STEAM ERA IN CACHE VALLEY AGRICULTURE

by

Michael W. Johnson

A Plan B project submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

History

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Finally, for my grandfather, Clarence Meyer, who fed a thresher when the world was young.

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ABSTRACT

Over 60 years have passed since steam threshing engines went out of production, yet the legendary machines refuse to vanish from the American scene. At scores of threshing shows every summer, millions of people turn out to experience the drama and poetry that is steam power. Of themselves, the machines are fascinating, but this alone does not explain the continuing interest that perpetuates the anachronistic rituals of steam threshing. The rhythmic tuck-a-tuck of the exhaust, the drone of the separator, and the lingering aroma of coal smoke and valve oil provide a vital link to the age of our fathers and grandfathers. For many, observing a steam engine at work is a profound emotional experience.

In the Cache Valley of Utah and Idaho, the steam threshing phenomenon is alive and well. When steam was retired in this part of the wheatbelt, collectors scoured the area to preserve examples of the venerated machines. Their annual threshing bees delighted the rural community. Today, most of those original collectors have gone to their reward, but their engines continue to operate at a local agricultural museum, the Ronald V. Jensen Living Historical Farm. Out of many special events on the museum's calendar, steam threshing consistently draws more visitors than the others combined. The high level of sustained interest demonstrated by local residents indicates that steam threshing is perceived as a significant part of their history and culture.

Surprisingly, little has been written on this topic by local or, indeed, national historians. Almost four decades have passed since Reynold Wik published Steam Power on the American Farm, the only

comprehensive book to deal with agricultural steam engines in the United States. This remains a fine and informative monograph, but it ignores that part of the wheatbelt that fell within the Mormon sphere of influence. An in-depth exploration of local steam threshing would reveal a great deal about lifestyles and values in Cache Valley, especially during that critical period that Charles Peterson has dubbed "the Americanization of Utah." But before such weighty issues can be tackled, a good deal of basic information must be assembled. That is the purpose of this work.

The following pages endeavor to chart the rise and fall of the steam era in Cache Valley agriculture. Because the equipment and many of the customs evolved in other areas, it begins with a national overview. It then establishes the beginnings of steam power locally as a precedent for its eventual adoption in agriculture, and it describes the conditions which made that adoption a reality. Going further, it addresses local sales practices, steam plowing, the training of enginemen, wheat harvesting methods, and the hazards of engine operation. The demise of the steam engine is discussed as a consequence of the internal combustion tractor. Finally, a brief retrospective examines the significance of agricultural steam power in Cache Valley history and culture.

(52 pages)

AGRICULTURAL STEAM POWER IN AMERICA

Steam power was a latecomer in the farmlands of Northern Utah and Idaho. When whistles first echoed across the Cache Valley, steam engines had already been playing a significant role in American agriculture for over forty years.[1] Scores of manufacturers were building a variety of proven designs as well as national networks for sales and spare parts. Even before the outbreak of the Civil War, the business practices of the custom thresherman were well established.

America's first agricultural steam engines were used on southern plantations. They were stationary power plants, bolted to the floor of a shed, that drove machinery through a system of belts and line shafts. By 1830, such engines were commonly threshing rice, sawing wood, ginning cotton, and grinding sugar cane. Costing as much as seven thousand dollars, they were the hallmark of capital intensive agriculture.[2]

Stationary engines, though, were unsuitable for most rural applications. It was simply impractical to transport the work a long distance to a fixed power source. A portable steam engine was needed, one that could travel to the job. English mechanic Richard Trevithick began to produce portable agricultural engines, mounted on wheels, in 1812.[3] It was not until 1849, however, that A. L. Archambault of Philadelphia started production in the United States. Within a few years, there were at least twenty American manufacturers selling portables to an expanding market.[4]

Though the portable appeared in many forms, one design soon achieved dominance. Its basis was the locomotive type fire tube

boiler which doubled as the frame. Four wheels supported the boiler, and a one-cylinder engine was mounted on its top. Bolted to the front was a metal seat and a footrest. Here sat the driver, on high, as he proudly drove the horses that pulled the machine from job to job. This popular design was produced in a variety of sizes, ranging from ten to twenty horsepower.[5]

In the decade before the Civil War, portable steam engines saw increasing acceptance in rural America. They were well suited for powering threshing machines, but rather expensive. To recoup his investment of about one thousand dollars, the steam thresherman processed the grain of twenty to thirty neighbors, charging a few cents per bushel.[6] The new steam thresherman was no ordinary man of the land; he was a mechanic and a rural capitalist.

As years passed, portables received a great deal of attention from inventors. Self-propulsion was a natural evolutionary step, and several men sought a practical drive train for the engines. Once again, the English took the lead, producing chain-drive traction engines in the 1840s.[7] The same system was tried on many of America's early traction engines in the 1870s, but it met with disfavor. The chain had a tendency to slip off the sprockets when running downhill, sending the machine coasting out of control.[8] A gear-drive system soon became the accepted drive train.

Surprisingly, early traction engines had no steering mechanism. A horse was harnessed to the front axle, and it steered the engine into the curves. The driver still sat up front on a metal seat. Inventive genius prevailed, though, and in the 1880s, the steering gear, operated by a wheel on the rear platform, became a common

addition to American machines.[9]

As traction engines proved their reliability, they became the preferred power for steam threshermen. True, they were more expensive than portables, but the added cost of the traction drive proved cheaper than the horseflesh it replaced.[10] Portables continued to be produced throughout the steam era. For some, a portable was all that could be afforded, and for certain jobs, like sawing timber, self-propulsion offered no real advantage. Still, traction machines quickly came to dominate the catalogs of the major implement companies.

While the traction engine was evolving, steam plowing systems followed their own path of development. Throughout the last half of the nineteenth century, inventors on both sides of the Atlantic vied with dubious success to create a practical plowing engine. Their approaches can be grouped into three categories: rotary, traction, and cable-drawn.

Rotary machines employed whirling blades, fingers, or augers to scratch furrows in the earth. In general, they proved to be too heavy, too complicated, and overly expensive.[11] Traction machines towed the implement across the field, but suffered from the steam engine's characteristic poor power-to-weight ratio. After expending most of its power to propel its own bulk, a traction plow had little left over to pull the shares.[12]

Of all early steam plows, the cable-drawn types seemed to hold the most promise. Englishman John Fowler patented such a system in the 1850s. Fowler's system employed two traction engines, each with a windlass mounted under the boiler. Parked on opposite sides of a

field, the engines dragged the plow by winding in a cable. A Fowler engine did not, therefore, pull its own weight while it pulled the plow.[13] This system achieved notable acceptance in England and Europe, but was not well received in the United States. It was expensive, and it departed from the traditional practice of towing the implement. An 1865 editorial in Scientific American stated, "Our idea of a steam plow is one that will march into the bowels of the land without impediment."[14]

Steam plowing eventually came to America with the improvement of the threshermen's familiar traction engine. The key lay in the introduction of softer, more malleable steel. In A History of the American Locomotive, transportation specialist John H. White wrote:

> The early steels contained too much carbon and were too hard and brittle for boiler construction. As the price fell and softer alloys were manufactured, steel gradually became the accepted material for boiler construction, but not, surprisingly, until about 1890.[15]

Steel boilers, members, and gears were stronger and lighter than the old iron parts. Stronger boilers allowed higher steam pressures. This combination of lightness and increased power improved the power-to-weight ratio of the traction engine to about six hundred pounds per horsepower.[16] Steam plowing became a success, albeit a qualified one. The machines still bogged down in wet or hilly country. Yet in the broad plains and valleys of the arid American west, steam plowing engines were a common sight during the first fifteen years of this century.[17]

With the perfection of the internal combustion tractor, steam threshing and plowing engines faded quickly from American agriculture. Indeed, the tractor was so revolutionary that the

importance of the steam engine has been largely overlooked. It was steam, though, not internal combustion that ushered in the age of power farming. When the tractor first burst onto the scene, steam had been at work on the farm almost a century.

STEAM POWER COMES TO CACHE VALLEY

Steam power arrived in Cache Valley with the iron ponies of the narrow gauge Utah Northern Railroad. On January 31, 1873, the first diminutive locomotive proudly entered the city of Logan. Later, on June 9th, the railway finally connected to the Central Pacific mainline near Corinne, bringing the valley into direct contact with the manufacturing centers of the nation.[18] Suddenly, heavy machinery could be brought in with relative ease and expense, and the local economy began to mechanize.

That same year, a group of local businessmen formed a lumbering venture, The Hyrum Steam Mill Company. They purchased a three thousand horse power steam sawmill outfit in Logan and erected it on a site in Blacksmith Fork Canyon.[19] A year later, a valley cooperative opened two more steam sawmills, located in Logan and Franklin.[20] A large thirty horsepower steam mill, owned by the United Order Manufacturing and Building Company, was built about 25 miles up Logan Canyon and opened in 1879.[21]

Portable steam engines were wonderfully suited for powering sawmills. Boilers could be fired on waste products, and small canyon streams provided adequate water. Though sometimes mounted on skids instead of wheels, these were the same machines that powered threshing machines in other parts of the country.

By the early 1880s, steam machinery had become an accepted part of Cache Valley life. Narrow gauge locomotives hauled daily trains as chuffing steam mills cut lumber in the canyons. In Logan City, a steam hoisting engine was hard at work in the construction of the LDS temple.[22] Indeed, an 1884 directory listed seventeen people as locomotive engineers, stationary engineers, and firemen in Logan alone.[23] Years of experience had proven that the steam engine was an efficient tool that could be operated safely; soon it would bring the power of the industrial revolution to local agriculture.

THE EARLY YEARS OF STEAM THRESHING

By 1881, implement companies were actively promoting the use of steam engines in Cache Valley. In the pages of The Logan Leader, L. B. Mattison of Salt Lake City proclaimed his "New Masillon threshers, horsepowers, and engines;"[24] George Lowe of Ogden championed the Ames engine;[25] and another Salt Lake merchant, John W. Lowell, boosted "Cooper engines and sawmills."[26] Despite this advertising, Cache Valley farmers were not yet ready to adopt power machinery.

Sweep horsepowers were the accepted method of powering threshing machines in those days. Horsepowers came in various sizes with from three to seven sweeps; two horses pulled each sweep. The horses walked in a circle, transmitting power to the separator through gears, tumbling shafts, and universal joints. In Utah, where cooperation was a tradition, such rigs were often owned by threshing rings.[27] Each member supplied a team, and the most experienced farmer stood atop the power driving the horses. The horsepower had

its limitations, though. It proved impractical for more than fourteen horses, effectively checking the size and efficiency of the threshers it ran.[28] In 1880s Cache Valley, though, this limitation had not yet become a problem. Wheat production, though growing, had not outstripped the capacity of horsepower. As long as the grain could be processed before inclement fall weather damaged it in the field, there was no sound reason for buying an expensive steam outfit.

As the 1890s approached, significant changes were occurring. The Utah and Northern Railroad was standard gauged, allowing through shipment of carloads to the grain ports of the west coast. The Utah Agricultural College and its experimental stations were created, accelerating the improvement of irrigated and arid farming methods. Farmers were bringing more dry farm acreage into production and increasingly employed improved horse-drawn machinery. As wheat farming became big business, the technology of horsepowered threshing was pushed to its limits.

These changes were not lost upon Lars Fredrickson, a farmer, mechanic, and entrepreneur living near Weston, Idaho. Here was a man uniquely suited for success as a steam thresherman. Located in Cache Valley's growing breadbasket, he was a natural mechanic, a self-taught practical engineer with years of experience in water-powered machinery, and he already operated a small sawmill.[29] Not only could he use an engine for threshing, it could power his mill in the off season.[30] In 1892, Fredrickson and his brother-in-law Peter Jacobson became partners in a steam-threshing outfit, perhaps the first in all Cache Valley.[31] They negotiated the purchase of a Gaar Scott

traction engine from the Sidney Stevens Implement Company at a price of $1,350.[32]

John Richardson was another steam thresherman of the early 1890s. An historic photograph shows him standing proudly next to his portable while threshing in Richmond.[33] About this time, the Johnson Brothers were in business around Preston, using a Russell traction engine.[34]

Life was not easy for the early steam men, though. Dry farming was still in its infancy, and they were competing with a number of established horsepowered rigs. For their first five seasons, Fredrickson and Jacobson travelled to Malad in a yearly search for business.[35]

Toward the end of the decade, times began to get better. In 1897, the Weston threshermen found adequate work near home, and their success did not go unnoticed. Another pair of Weston men, Gifford and Jensen, ordered a traction engine the next year. Their twelve horsepower Gaar Scott machine was unloaded, with block and tackle and crowbars, on September 8, 1898.[36]

In fact, 1898 was a banner year for Cache Valley's wheat farmers. Growing conditions had been excellent, and production on some dry farms reached fifty bushels per acre.[37] Even better, top grade Utah wheat was fetching almost $1.20 a bushel at Port Costa, California.[38] Money flowed into the wheatlands of Utah and Idaho, and some of it was used to buy steam threshers.

The mid-1890s were the trial years for steam threshing in Cache Valley. A handful of progressive mechanics proved the technology while other threshermen looked on. As the turn of the century

Figure 1. Threshing on the Bullen Farm in Richmond during the early 1890s. John Richardson stands by the portable engine.

approached, steam power had shown itself to be the wave of the future. Soon it would reign supreme.

THE STEAM ENGINE BOOM

In 1899, the Peterson Family of Petersboro hired a steam thresher for the first time. Never again would horsepower thresh on their farm.[39] Indeed, the first decade of the twentieth century saw a boom in local sales of agricultural steam engines; the efficiency of the new power was indisputable.

Threshing, in the past, had always been a horse-killing job, coming at a time of the year when horses were already worn out by a summer's work. Though horses reproduced freely, they were still considered an expensive source of power. An agricultural textbook estimated that one horsepower hour produced by horseflesh cost about five cents, while one steam horsepower hour cost about a penny.[40]

Not only was it cheaper, steam power offered other advantages. It didn't tire at the end of the day. Threshing speed, extremely critical for proper operation, was maintained effortlessly by the engine's governor, and when threshing season was over, an engine did not have to be fed through the winter. Steam also liberated the threshing machine from the limitations of the horsepower device. Early separators could not demand more power than fourteen horses could deliver, but powerful engines allowed the building of larger, more efficient models. Ample power also permitted the addition of labor-saving appliances, so not only was the threshing engine an economic triumph in its own right, it represented a quantum leap in overall threshing efficiency.

By 1908, steam engines had become commonplace in Cache Valley's wheatlands. In August, the Newton correspondent to The Journal wrote, "Thirty headers and six steam threshing machines in Newton alone will be clearing up from four to six thousand bushels of wheat a day."[41] About a month later, the paper's Lewiston correspondent recorded this observation: "Lewiston is now in the midst of threshing. Since steam threshing has become so common, it is of short duration."[42] Steam power was ascendant. Though sweep horsepowers continued to be used and sold, where threshing was serious business, they had become an anachronism.

PLOWING AND OTHER JOBS

In the early years of this century, a traction engine represented a major investment. It was only natural that the owner of such an expensive machine would work it as much as possible. As the threshing season lasted only a couple of months, there was plenty of time when an engine was available for other jobs.

Work fell into two categories: belt work and drawbar work. Throughout the country, engines were known to have been belted to a variety of machinery. In Cache Valley, they were used primarily for threshing and for powering sawmills. Elsewhere in Utah, they were known to run hay balers and silage blowers,[43] and perhaps did so in the valley.

Engines could also pull, and all manner of things were hitched to their drawbars. At least one building, the widow Nielsen's house in Weston, was moved by two engines in 1910.[44] At times, steam power may also have been used for road haulage, like the two big Avery

machines pictured hauling ore near Brigham City.[45] Or perhaps, as in other parts of the nation, traction engines may have occasionally pulled road graders or scrapers. In any case, their most common form of local drawbar work was undoubtedly plowing.

In 1907, a publication of the Utah State Agricultural College stated, "A number of companies in this region are preparing to do their plowing, especially for arid land, with traction engines."[46] Indeed, steam plowing was becoming well known throughout the Rocky Mountain states.[47]

Impressed by what he saw on a trip to the Curlew Valley, a correspondent to The Logan Republican described plowing engines at work:

> One very interesting feature was watching the steam plows. One belonging to Robert Sweeten and sons was in operation, and it certainly looked like business to see an engine plow with three six-gang plows, besides dragging, pulverizing, and drilling all at the same time; thus completing forty to fifty acres per day with the aid of only two men to run the engine and plows and one man to run the water wagon. Problems that to us seem complex are mere play-work out there; though a few years ago it was only a sagebrush wild.[48]

Such stories of glowing success certainly influenced the farmers of Cache Valley. Some bought the expensive plowing outfits and tried their hand at custom work. Local men showed a distinct preference for Reeves equipment. Ferdinand Fredrickson, Jr. of Weston bought a twenty-five horsepower Reeves engine in 1907, using it to pull a gang of ten 14-inch plows.[49] Larsen Brothers of Newton bought a twenty horsepower cross-compound Reeves, but found it too small for efficient operation.[50] This was certainly not the case of the giant forty horsepower Reeves, complete with wooden cab, photographed plowing near Preston, Idaho.[51]

Plowing engines were generally two-cylinder machines, larger than those used only for threshing. The cylinders were often arranged in compound; the second cylinder powered by the exhaust steam of the first. Under most circumstances, compounding provided a major improvement in efficiency. The big engines worked a good share of the year, threshing or plowing according to the season.

In the valley, as elsewhere, steam plowing was cut short by the introduction of the internal combustion tractor. It is unlikely that the practice continued beyond 1915.[52] In real terms, steam plowing probably had little overall effect on local agriculture. It was an experiment that achieved marginal success.

SALES PRACTICES

Cache Valley's rapid acceptance of agricultural steam power cannot be wholly explained in terms of technological efficiency. Aggressive marketing and easy credit, in large part, spurred the steam engine boom.

Manufacturers of steam threshing machinery sold their outfits in two ways. They either worked directly through their own travelling salesmen or cooperated with local implement dealers on a commission basis. The dealer's incentive was substantial; early commissions ranged as high as twenty-five percent.[53] In 1902, J. I. Case led the industry to lower commissions of around ten percent, but increased volume continued to keep threshing machinery a lucrative sideline for local agencies.[54]

Machinery companies and their agencies worked hand in hand to promote sales. Both liberally distributed enticing propaganda,

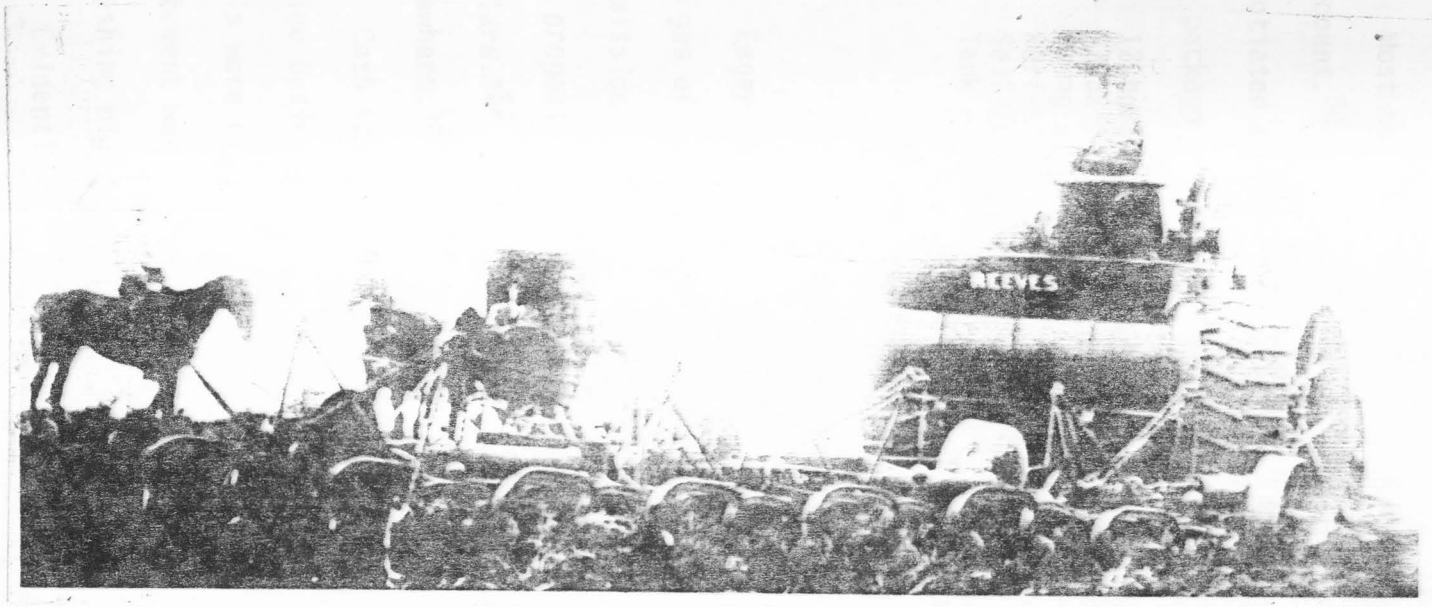

Figure 2. A forty horsepower Reeves pulling sixteen bottoms on the gang plow near Preston.

beautifully illustrated catalogs and engineers' guides filled with glowing testimonials. Engines and threshers were proudly displayed to potential customers at the Utah State Fair.[55]

Most manufacturers encouraged cash sales with a ten percent discount.[56] The Sidney Stevens Implement Company, Logan Branch, negotiated such a deal in 1899 with Bowman and Baker of Lewiston. The package of Gaar Scott equipment broke down as follows:

13 horsepower portable plain engine	$1,100
33-52 separator	455
Swing stacker	100
Perfection weigher and loader	110
Self-feeder and band cutter	190
Tank without trucks	440
	$1,995
Less ten percent for cash	-$ 200
Total purchase price	$1,795

Eager to make the sale, the company agreed to pay freight charges of approximately one hundred fifty dollars out of its commission. O. W. Matthews of the Logan Branch wrote, "I figure that the proposition, if accepted, will net us about three hundred dollars."[57] Unfortunately for Mr. Matthews, Bowman and Baker bought elsewhere.[58]

Cash sales, though, were unusual in the valley. The steam engine business was built upon liberal credit. It was an era when deals were closed with a handshake, and to ask a man for a property statement was to impugn his character.[59] A two thousand dollar threshing rig could be had with little more than a good reputation.

Evidently, Fredrickson Brothers and Nelson had a good reputation. In October of 1898, they ordered an Aultman-Taylor outfit on credit through the Stevens Company. Terms of the sale

called for the first five hundred dollar payment to come due on December 25, 1899. Like payments were due each Christmas for the next 3 years. Aultman and Taylor financed the deal which was secured by a chattel mortgage, probably at ten percent interest.[60] The implement company received a commission plus a two percent fee for collection.[61] After the machinery was delivered to Cannon Station the following June, an implement company official wrote that the new owners:

> Fired up the engine after our man left and ran it several miles, and she behaved splendidly. They are well pleased and think they will get all the threshing out there. Its a fine outfit in splendid hands.[62]

Not all owners were well pleased. Defective equipment sometimes enraged threshermen and wrought havoc on the reputation of the dealer. When Gifford and Jensen unloaded their Gaar Scott traction engine in September of 1898, it ran perfectly until it came to a hill. Then, it began leaking steam and the frustrated owners believed they had been sold a second-hand unit. A practical engineer was called in to install new packing, adjust the valve gear, and the implement company picked up the bill.[63] All seemed well until the engine's throttle valve cracked.[64] After discussing the matter with the owners of a Nichols and Shepherd machine, Gifford and Jensen concluded that their Gaar Scott was a lemon. When the first three hundred dollar payment came due in January, they balked. News of the defective engine was spreading throughout the rural community, and the implement company quickly worked out a settlement. The two threshermen made their payment, turned back the errant engine, and ordered another.[65]

There was also a market for used steam engines. Trade-ins were

accepted on the purchase of new equipment and resold by the local agencies. It was not uncommon for individuals to trade amongst themselves. One owner even resorted to the classified section of The Journal to advertise his Gaar Scott in 1906.[66]

As the century's first decade wound down, so did the boom in steam engine sales. By 1911, the local market was in a slump, and custom threshermen were once again travelling great distances to get enough work.[67] Lorenzo Peterson of Hyde Park spent weeks at Poverty Flat in the northern extreme of the valley.[68] The McBride rig of Hyrum chugged all the way to Blue Creek Valley at 3 miles per hour.[69] Larsen Brothers of Newton shipped their thresher to Idaho on a railroad car, finishing their season near Bancroft.[70]

In the valley, steam rigs would continue to be sold as old engines wore out, but never again in large numbers. As the slump in sales continued, attention focused on a new form of power--the gasoline tractor was coming of age.

HARVEST PRACTICES IN THE STEAM ERA

The customs of steam threshing had their origins in the horsepower era when wheat was grown on small irrigated farms. Neighbors exchanged labor, and the threshing dinner was a gluttonous tradition. Work days were abbreviated; the volunteer laborers having their own chores to do at home. In irrigated areas, these practices continued in the age of steam, but on the big isolated dry farms, different methods developed.

On irrigated farms, harvesting was the farmer's responsibilities.[71] Using his own, or a hired binder, the wheat was

cut and put into bundles. The bundles were shocked (put into small stacks, ten or more bundles to the shock) in the field. After drying at least a week, the wheat was loaded onto a wagon and hauled to the threshing site. Here the bundles were piled with pitchforks into large stacks. Farmers believed that the stacked wheat went through a "sweat," a process deemed necessary for the production of quality grain.

The farmer made arrangements with a custom thresherman, and after at least a week of sweating, the grain was ready to be threshed. Eventually, a steam outfit arrived. The engine towed the separator and a large water tank. After setting out the separator and tank, the engineer aligned and belted up his iron horse. A crew of three operated the machinery: an engineer and a separator man, usually the owners, and a hired hand to haul coal and water. The farmer supplied the other labor. Friends and family fed the bundles, sacked the grain, and hauled it to storage.

Threshing day started early. Around 5:00 a.m., the engineer began firing up while the separator man adjusted his machine. An hour or so later, the laborers arrived (after completing their own chores at home) and commenced threshing. It was hard work, sometimes punctuated with coarse stories and vigorous laughter.

At mid-day, the job halted for dinner. Starving men devoured platters of meat, potatoes, vegetables, as well as milk, cold water, pie, and cake. This exercise in gluttony was an obligatory part of cooperative threshing etiquette. Though neighbor women pooled labor to produce these feasts, they still faced hours of drudgery in hot kitchens.

In his later years, John W. Fitzgerald recalled:

> They liked their work. Few things make the sails of a woman's "Ship of State" fill more profusely, nor bloat their egos more with satisfaction, than to have the food they prepare eaten with relish and then ask for more.[72]

Grant Simmonds of Trenton recalled things differently. He described the hot stoves and long hours remarking, "Women just hated threshing!"

After dinner came a short nap and then threshing resumed. The work continued until the job was done or until the crew had to return home for evening chores. The engineer banked his fire and retired, or hitched up the rig to go to the next farm. If the machinery had broken down, it was not uncommon for the owners to work late into the evening making repairs by lantern light.

On the dry farms of Cache Valley, different methods were used.[73] The farmer was still responsible for harvesting, but used a header for the job. A wagon paralleled the moving header to receive the wheat. When the wagon's header box was filled, it travelled to the threshing site. The wheat was then unloaded and stacked, not with pitchforks, but with a derrick and a Jackson fork.

After the requisite period of sweating, the steam thresher arrived. In dry farm country, the thresherman was expected to provide greater service and crews were large. Crews were required to feed the separator, deliver the grain to the railroad, and load it onto the cars. In earlier days, the grain was hauled to the railroad in sacks. After 1910, grain wagons were often used to haul the commodity in bulk. The charge hovered around six-and-one-half cents per bushel.

One crew of the 1918 season contained the following:

3 pitchers

3 straw stackers

2 teamsters

1 engineer

1 separator man

2 men to load railroad cars

2 female cooks

1 girl as cook's assistant[74]

Labor generally came from the ranks of friends and relatives, or young valley men without their own farms. Transient labor was considered a last resort.[75] The cooks were often wives of the owners, and they prepared meals in a thresher's camp, a cook tent mounted on a wagon.

Threshing was big business in dry farm areas. As the years progressed, the custom men adopted larger, more efficient machines. Engines and separators grew in power and size. Self-feeders and windstackers became popular additions to the thresher after 1900, and capacity and efficiency were greatly increased. In 1900, a steam outfit was threshing on the Peterson farm, and O. L. Peterson recorded in his diary, "Threshed over one thousand bushels of wheat today; a fine run."[76] Seven years later he noted a one-day run of 1,812 bushels.[77]

At the end of the threshing day, it was usually too far for crewmen to go home. They camped in the open, or, in foul weather, retreated to the barn. If they were lucky, the host farmer provided evening entertainment. The Petersons often cranked up their

phonograph or sometimes provided a watermelon feast for the threshing crew. On one hot day, they rewarded the threshers with a ten quart can of ice cream, shipped in by rail at their own expense.[78]

Bad weather or breakdowns were another treat for the crewmen, but at the thresherman's expense. Damp wheat would not thresh properly, and rain could shut down an operation for three days or more. Mechanical failures could also bring an unexpected halt to the work. Successful engineers were good mechanics, able to fix problems in the field. Even with tricks such as newspaper gaskets and candlewick packing, some calamities defied the engineers' ability.[79] When this happened, it might take days to receive a replacement part from the factory.

Such downtime could be a costly problem for the custom thresherman; the threshing season lasted only about two months. Winter wheat was grown on the dry farms, and it was ready for threshing in late July or early August. Spring wheat, grown on the irrigated farms, was ready about a month later. Many custom men started on the arid lands and finished out their season around the farm villages. In any event, threshing was over by early October before inclement weather could spoil the crop. In this short season, the steam thresherman hoped to recoup a major investment and to make at least a modest profit.

TRAINING OF ENGINEERS

For their time, steam engines were complicated pieces of equipment, dangerous when mishandled. Railroad enginemen often spent years learning their trade. Firemen had to pass lengthy examinations

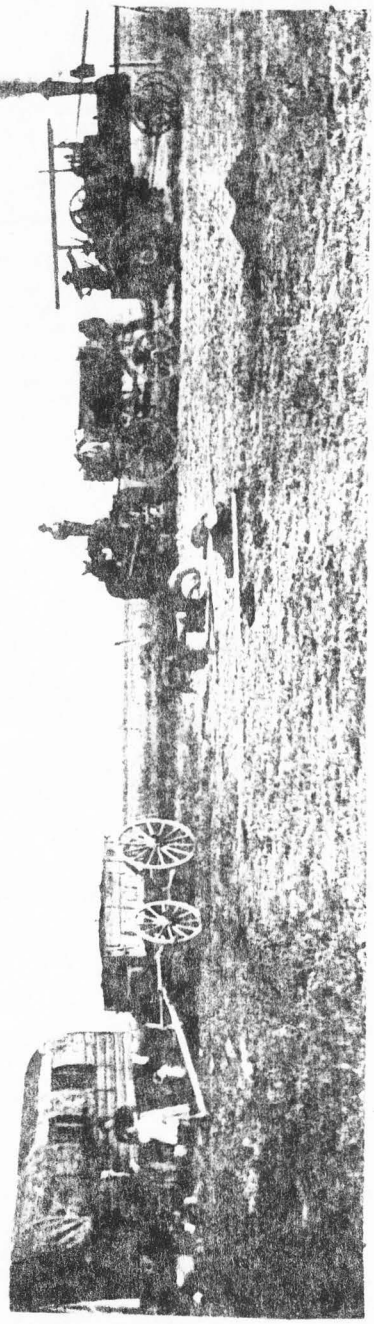

Figure 3. A threshing camp in Petersboro, circa 1908.

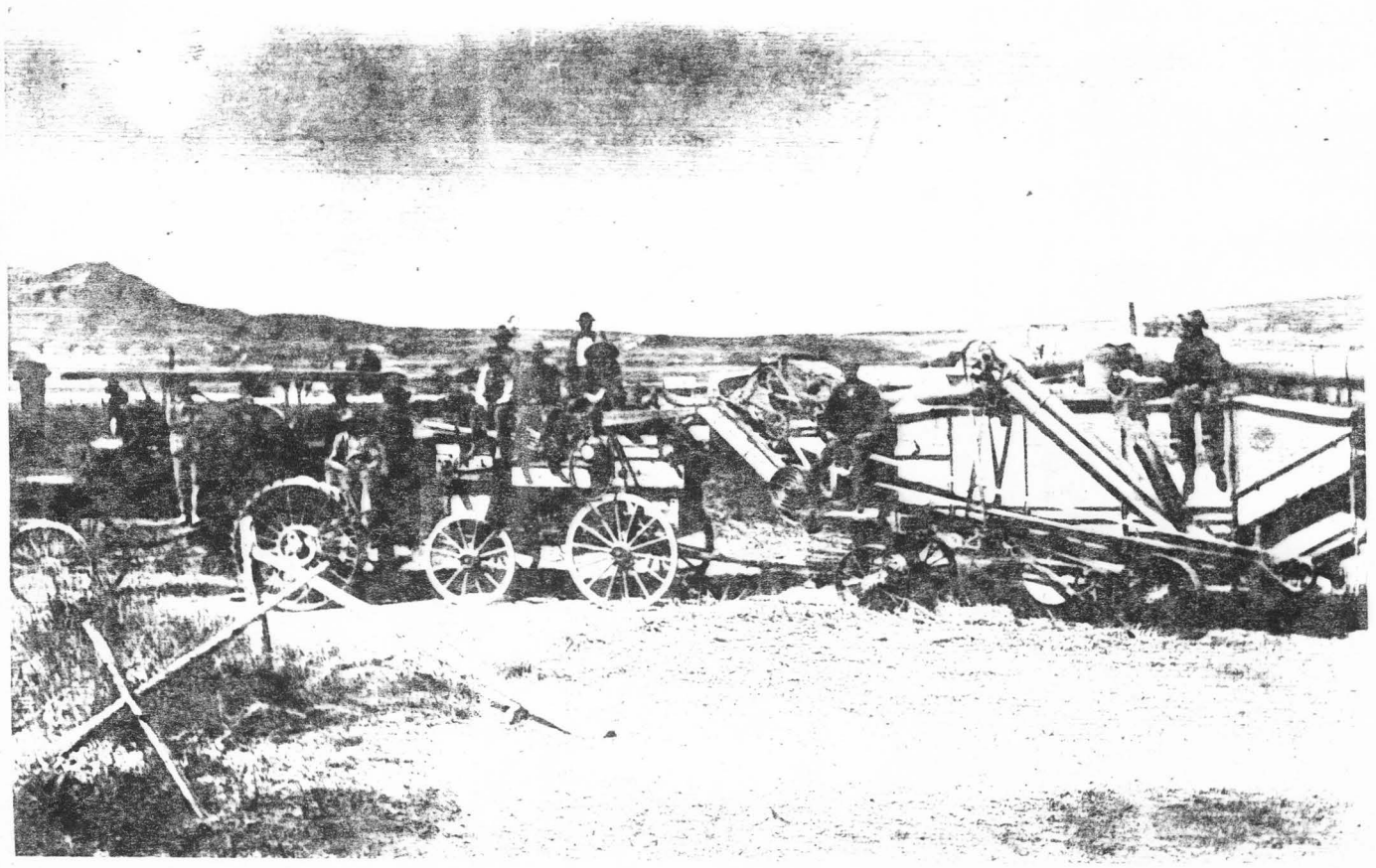

Figure 4. Hitting the road with a Case outfit in dry farm country.

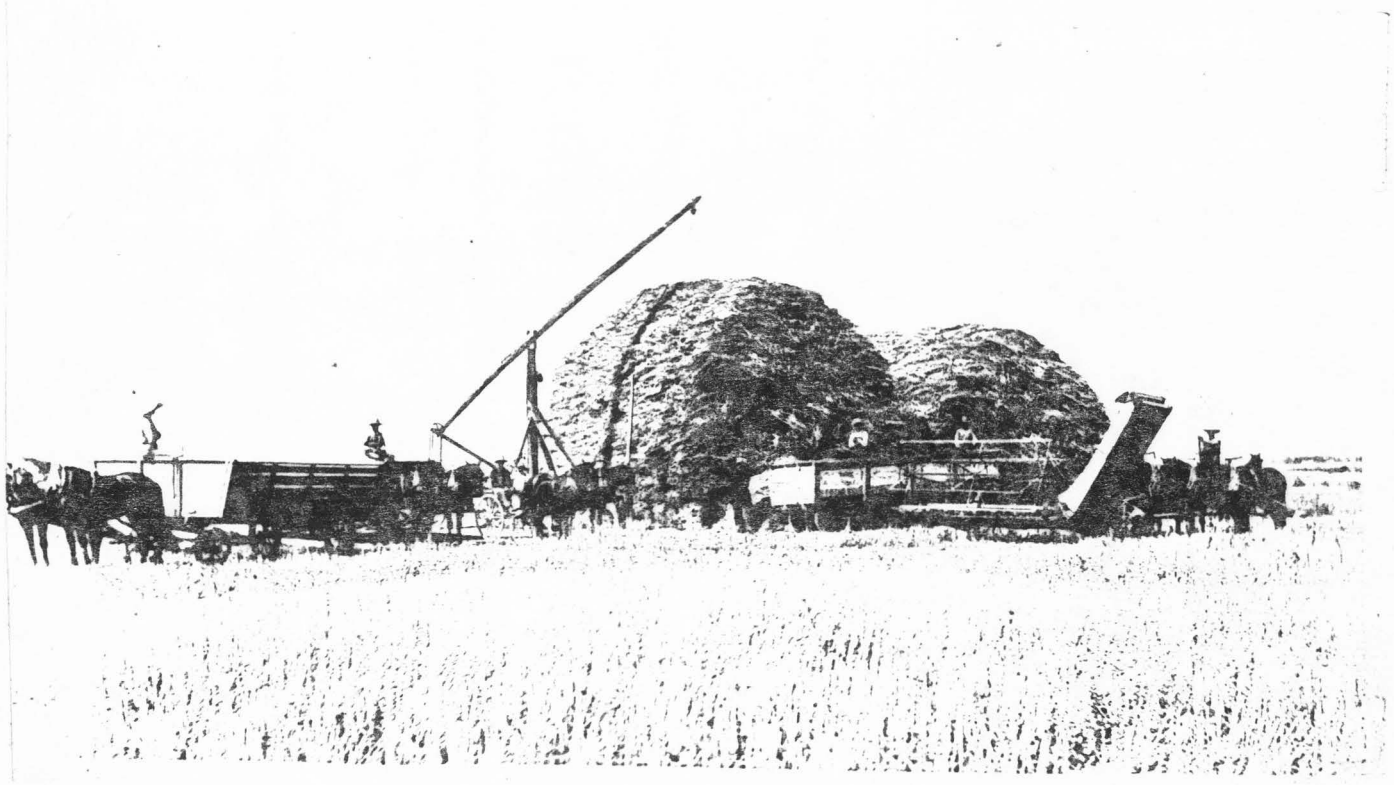

Figure 5. Stacking headed grain with a Jackson fork on the Peterson Farm, Petersboro.

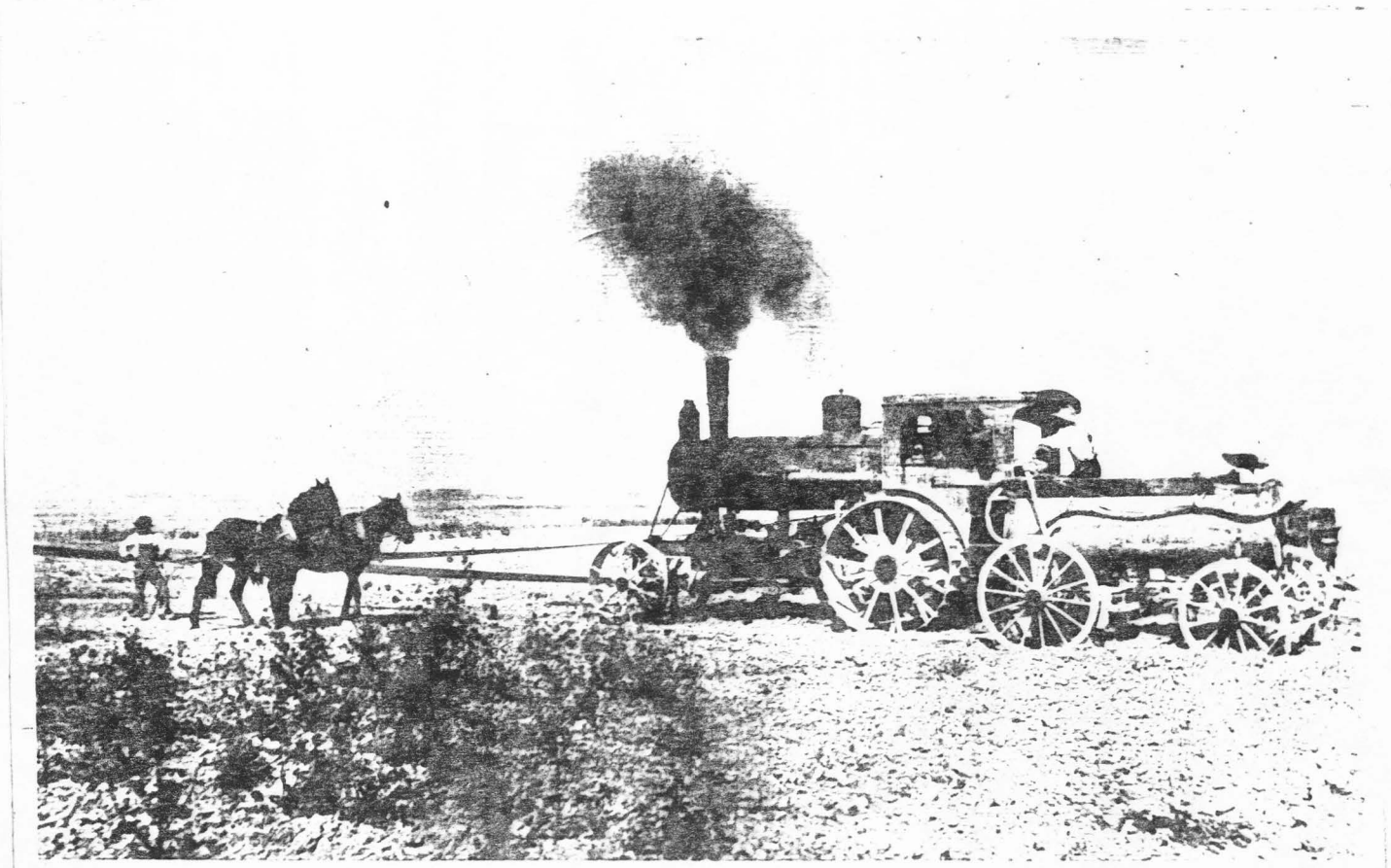

Figure 6. Threshing with Dahle Brothers' big Avery. The team operates the Jackson fork.

before advancing to engineer. In Cache Valley, anyone with decent credit could buy a traction engine and proclaim himself an engineer.

Fortunately, for safety's sake, those who bought engines generally had a mechanical background. Some, like Eph Blanchard, had been horsepower threshers; while others, like Lars Fredrickson, had shop experience. Later, farm engineers picked up the trade as crewmen on some of the pioneer rigs. Anton Jensen worked for Fredrickson and Jacobson three years before buying his own steamer.[80] Henry Fredrickson, Ferdinand Fredrickson, and Ferdinand Fredrickson, Jr. also got into the business this way.[81]

There were also aids for self-taught engineers. Detailed manuals accompanied the sale of a new traction engine. International Correspondence Schools operated in the valley,[82] providing general reference materials on steam technology, and trade magazines, such as The American Thresherman, provided a wealth of practical information.

By 1907, the Utah Agricultural College had started a class called "Farm Mechanics" in which steam and gas engines were studied.[83] For students in the 1913-1914 school year, a course on tractors was offered. The college catalog described it as "A detailed study of steam and internal combustion tractors and practice in handling them."[84] This class only lasted one year. From 1914 through 1919, steam power was studied as part of a class titled "Farm Motors."[85]

The number of working engineers that were trained by the UAC is a matter of speculation. Throughout the age of steam, most engineers probably were self-taught or learned on the job. As one Trenton resident observed, "They were men with a natural ability."[86]

THE DANGERS OF STEAM THRESHING

Danger is inherent in the operation of any heavy machinery. The potential for disaster in turn-of-the-century threshing machinery was frightening. The large flopping belt whirled by all manner of unguarded gears and pulleys, and the threat of boiler explosion was ever present. Surprisingly, there were few calamities, and steam threshing was not viewed as a hazardous job.[87]

When the steam engine boom came to Cache Valley, most boilers were being manufactured from steel. A fusible plug in the top sheet (crown sheet) of the firebox guarded against low water explosions. No records have been found of boiler explosions in Cache Valley.

Fire seems to have been the greatest hazard. Sparks from an engine or a tossed cigarette burned up thousands of dollars worth of wheat. Anton Jensen lost his wooden separator in one such fire, while the farmer lost his entire grain crop.[88] In 1898, another separator burned when grain dust exploded inside the machine itself.[89] This hazard was one reason that J. I. Case introduced a line of all-steel threshing machines.[90]

Weak bridges and culverts also posed a hazard for the heavy machines. Vance Walker's engine crashed through the bridge at Hampton's Crossing in 1910. Luckily, the machine didn't fall into the river, and no injuries were recorded. This was, perhaps, of little solace to Mr. Walker, whose engine was left straddling a bridge abutment.[91]

According to The Logan Republican, Richmond City recognized the problem in 1911. The paper reported that the council had passed an ordinance requiring the drivers of traction engines to lay down two-

inch planks before crossing bridges and culverts. Each violation was to carry a fine of twenty-five dollars![92]

There were a number of freak accidents, too. James Johnson almost lost a finger when belting up an engine.[93] A man in Newton was killed when he was run over by the tank of a steam thresher.[94] A six-year-old boy fell onto the self-feeder of a threshing machine, but quick action by a crewman saved him from the whirling machinery.[95]

THE SUCCESS OF INTERNAL COMBUSTION AND THE DECLINE OF STEAM

In the glory days of Cache Valley steam power, a usurper was already on the horizon. Charles W. Hart and Charles H. Parr cooperated to produce America's first successful internal combustion traction engines in 1902.[96] To differentiate these machines from their steam predecessors, Hart-Parr called them tractors. As the decade progressed, several manufacturers worked to perfect and produce the new machines.

By 1910, at least one Hart-Parr tractor was at work in Cache Valley,[97] and interest in the new technology was on the rise. The following year, E. D. McCombs retired his Case steamer in favor of internal combustion. On August 22, McCombs' big forty-five horsepower IHC tractor was set out at Cache Junction by the northbound freight. The machine impressed O. L. Peterson, who noted it in his diary.[98] The Petersons, in turn, purchased their own thirty horsepower tractor several months later.[99]

Men like McCombs and Peterson recognized that the tractor

represented superior technology. Its power-to-weight ratio was unmatched by the finest steam engines. Where steam plowing had achieved limited success, tractor plowing was an unqualified success. The custom thresherman who powered his rig with a tractor, therefore, became a successful custom plowman in the off season.

Early tractors, though, still had some problems. They were expensive, sometimes hard to fix, and they had a reputation for being difficult to start. More than one Cache Valley farmer was financially ruined by his oversize and expensive tractor.[100]

Because of these problems, large tractors had limited appeal. During the 1915 threshing season, a Newton correspondent remarked that only one thresher in his area, the Ecklund Brothers', was gas powered.[101] In the heart of the Cache Valley breadbasket, four out of five threshing outfits were still run by steam. About that same time, tractor builders adopted a different strategy. They began to produce small, inexpensive machines that met with instant popularity. Nationwide production of steam engines plummeted.

Steam power, though, did not die out immediately. Some men had a romantic attachment to steam, while others were intimidated by internal combustion technology. Aultman and Taylor advertised in The Utah Farmer, "While the oil burning engine has attracted the attention of many power users, the steam engine is still a favorite in many localities."[102] In a later edition, Nichols and Shepherd proclaimed, "Anybody can run a Nichols-Shepherd Steam Engine. It does not take a master mechanic to keep it in shape."[103] During World War I, a number of steam engines were certainly hard at work in the area. When these machines gradually wore out, though, they were

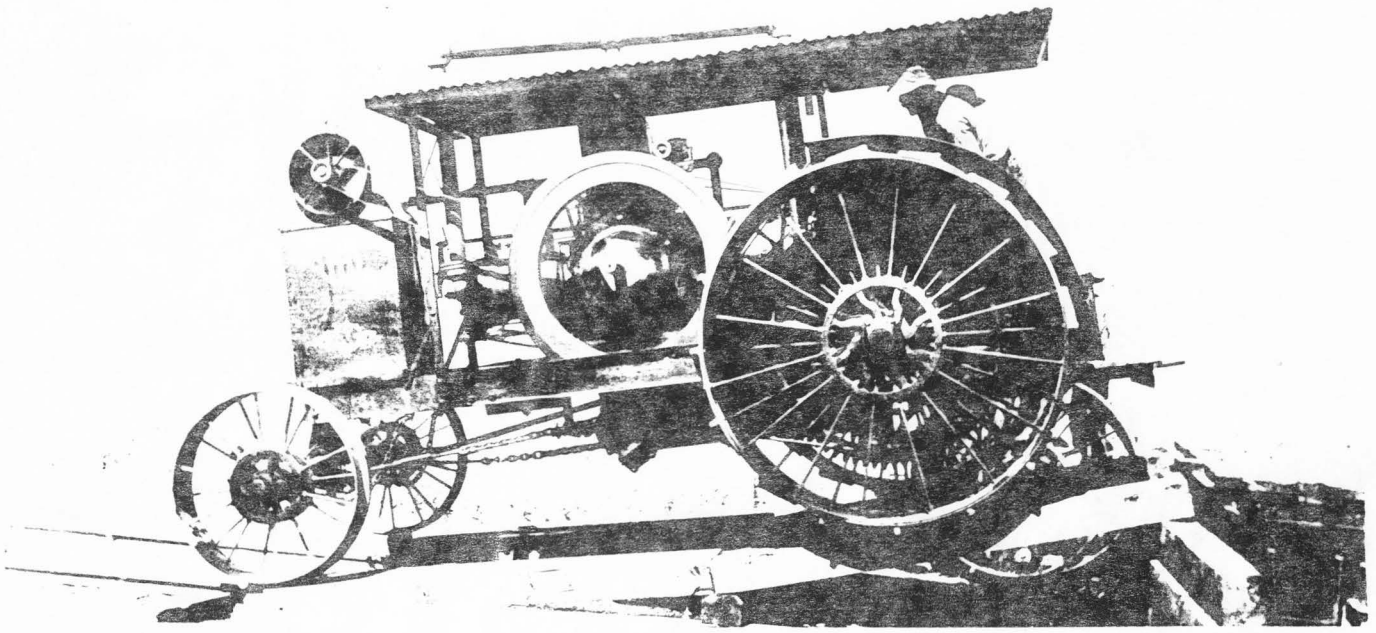

Figure 7. The usurper. Unloading McCombs' tractor at Petersboro Spur in 1911.

replaced by the ubiquitous tractor.

Statistics tell the story. In 1907, the peak year of steam engine production, only about six hundred tractors were at work in the United States.[104] In 1920, ninety firms built 203,207 tractors, while fifteen companies built 1,776 stream machines.[105]

By the mid-1920s, the steam engine was an anachronism in Cache Valley agriculture.[106] A few may have hung on later, according to local folklore, but such cases would have been exceptional. With no demand in Utah or elsewhere, steam production was gradually discontinued across America in the late 1920s. For some men, this passing was like the loss of a close friend.

IN RETROSPECT

In real terms, the agricultural steam engine had a profound effect upon the economy of Cache Valley. Steam threshing was one of many improvements in the area's evolving wheat economy; improvements that worked together to increase grain production from 235,000 bushels in 1880 to 1,500,000 bushels in 1910.[107] Improved farming methods, efficient machinery, storage facilities, and adequate transportation were all linked together in a capital intensive market system. Without the immense threshing capacity made possible by steam power, this system would have been severely crippled. Wheat might not have attained its status as a cornerstone in the valley's turn-of-the-century economy.

The story of steam cannot be explained solely as a matter of economics. Lumbering across the countryside or indefatigably powering a threshing machine, these engines became a potent symbol in

Cache Valley. They represented progress and the prosperity that market agriculture promised. Their bright colors and gaudy decorations announced the triumph of American craftsmanship, while their owners were seen as progressives, leading the countryside toward the good life.[108]

Eighty years later, the steam engine has become a piece of nostalgia, a tangible reminder of what has been called the golden age of Cache Valley agriculture. It conjures up images of communities working together and the kinship of abundant threshing dinners. It reminds us of pride in workmanship and a lost optimism in the promise of technology. The sights, smells, and sounds of this antique machinery represent much that was deemed worthwhile in American society, much that has been lost on the road to progress. This is the magic that keeps steam threshing alive. May the magic last, and may the pungent aroma of coal smoke and valve oil continue to drift over the wheatlands of Cache Valley.

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APPENDIX A

A Partial List of Steam Threshermen Who Lived or Operated in the Cache Valley

Name	Dates	Residence	Engine
Fredrickson (Lars) and Jacobson (Peter)	1892-1918	Weston, ID	Gaar Scott
Johnson Bros.	c. 1895	Preston, ID	Russell
John Richardson	c. 1895	Richmond	
Gifford (Warren) and Jensen (Hyrum)	1898	Weston, ID	Gaar Scott, later on Aultman-Taylor
Eph Blanchard	1899		
Fredrickson Bros. (Ferdinand and Henry) and Nelson (Carl)	1899	Weston, ID	Aultman-Taylor
C. Larsen and Sons	1900	Newton	Aultman-Taylor
Jos. Cantwell	1901	Cache Jct.	
Jensen (Hyrum) and Jensen (Anton)	1901	Weston, ID	Aultman-Taylor
Jos. Kempher	1903	Cache Jct.	
Goss	1904		
E. D. McCombs	1905-1911	Providence	J. I. Case
H. M. McBride	1905	Hyrum	Aultman-Taylor
W. J. Barker et al.	1906	Newton	Aultman-Taylor
Ferdinand Fredrickson, Jr.	1907	Weston, ID	Reeves
Jones Bros.	1908	Cache Jct.	

Larsen Bros. (formerly C. Larsen & Sons)	1908	Newton	Reeves
Dahle Bros. (Ed and Mose)	1909	Cache Jct.	Avery
Vance Walker	1910	Mendon	
Anton Jensen	1910	Weston, ID	
Bradshaw Bros.	1910	Wellsville	
Hadley Bros.	1911	Oxford, ID	Aultman-Taylor
Lorenzo Peterson	1911	Hyde Park	
Michael Anderson	1912	Newton	Aultman-Taylor
James Bateman	1912	Richmond	J. I. Case
Robert Fryer	1914	Collinston	
Bishop James Hess	1915	Fielding	
Brown and Bankhead	1916	Hyrum	
Lamb	1918	Fielding	
Fredrickson (Fred) and McCulloch (Ray)	1918	Weston, ID	
Olaf Christensen	1925	Weston, ID	
Clarence Goodsell		Weston, ID	Gaar Scott
John Martin		Glendale, ID	J. I. Case
Lafe Henderson		Clifton, ID	J. I. Case

APPENDIX B

Dry Farming and Steam Power

Though many developments in old Cache Valley contributed to the adoption of agricultural steam power, paramount in importance was the perfection and expansion of dry farming. The success of nonirrigated agriculture accounted for a startling increase in wheat production during the last quarter of the nineteenth century. Large scale production eventually required the efficiencies that came with steam threshing.

In Cache Valley, dry farming came to fruition during the decade of the 1870s. Lands that could be easily irrigated had been placed under cultivation, and progressive farmers looked to the arid range as the next area of development.* Yet the exploitation of this land demanded a new agricultural method, one that proved a radical departure from the traditional practices of Mormon farmers. Through trial and error, dry farmers discovered a series of techniques that worked in concert to maximize the effect of natural precipitation. These included fall plowing, plowing deeper, fallowing, and weed control. The method was well suited to small grain crops, and soon wheat was ripening where only native grasses had grown.

Growth was phenomenal. In 1880, Cache County's wheatlands consisted of about 12,000 acres. By 1894, this total had jumped to 43,328 acres, approximately three quarters of which was in dryland cultivation. Techniques and seed varieties were improved further when the Utah Agricultural College became an active promoter of dry farming after the turn of the century. By 1910, more than 80,000

acres in the county were planted in wheat.[+]

This rapid increase in production pushed the technology of horsepowered threshing to its limits. Larger separators were needed to handle the load efficiently, larger than the biggest horsepower units could drive. In the early 1890s, valley threshermen began turning to steam power as a solution.

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