Odometers
DISTANCE MEASUREMENT *on* WESTERN EMIGRANT TRAILS

BY NORMAN E. WRIGHT

In his classic novel, The Way West, *A. B. Guthrie captures the feeling that many western emigrants must have had as they crossed the Missouri River and started west. It was 1,000 miles to the valley of the Great Salt Lake and 2,000 miles to California and Oregon.*

Guthrie describes a scene on the bank of a western stream where two emigrant women are rinsing and wringing out clothes. Judith, the younger of the two, is a delicate and pregnant emigrant wife. Her companion, Rebecca, is a robust woman, better able to handle the rigors of wilderness life.

> It occurred to Judith that Rebecca was the type of woman for the trail. She was stout and assured and able and unafraid. If ever a cloud hung over her, no one knew it. If ever the thought of miles depressed her, she didn't let on.
>
> Miles. Distance. Distance was the enemy, not Indians or crossings or weather or thirst or plains or mountains, but distance, the empty, awesome face of distance, the miles on wrinkled miles of it, the levels and hills and hollows and bluffs, unconquerable by the slow turn of wheels or the creaking step of oxen. There was no end to it, not even any shortening. Morning and night it was there unchanged, hill and cloud and skyline beyond reach or reckoning. Sometimes Judith wondered at the stubborn, crazy courage of men who thought that day on day would add to Oregon.
>
> "It seems so far," she said to Rebecca.
>
> "Don't it, though?" Rebecca replied, tossing a twist of clothes into a basket. "Tell you what helps, though. Don't think how far. Just think one day at a time."[1]

In our age of high-speed jet travel, we moderns have little respect for distance. Time is our major concern. The fact that Omaha, Nebraska, is 931 miles from Salt Lake City is relatively unimportant. What is important is the two-hour flight time between the two cities. We spend a busy day and return home the same evening to sleep in our own beds without giving a second thought to the 2,000 miles we have traveled.

For the early western emigrants, it was just the opposite. Time was not a serious consideration except as it involved getting over high mountain passes before winter. Their journey began in the spring and extended into late summer or fall. Hours made little difference, but the distance traveled each day was important because it represented progress toward their ultimate destination. Recording it was an exercise in Rebecca's philosophy of "one day at a time."

It is not surprising, therefore, that distance traveled each day appears almost universally in the overland journals of western emigrants. Written in a variety of formats, distance notations

This article originally appeared in *Overland Journal* (v. 13, no. 3, Fall 1995, pp. 13–24). It is an edited version of a paper Dr. Wright presented at the 1994 Oregon-California Trails Association convention in Salt Lake City.

1 A.B. Guthrie, *The Way West* (New York, N.Y.: Bantam Books, Inc., 1982), 170.

reflect the personality and style of each writer. The following examples were taken from more than 100 emigrant journals reviewed in the overland collection of the Huntington Library in San Marino, California:

Made 15 miles
Traveled about 25 miles
We traveled this day 10 miles
We traveled 17 miles—no grass or water
Distance 16 miles
Traveled twelve miles
Tld 14 M
Mch'd 18 miles
Distance today 19 miles
We have come 18 miles
We traveled near twenty miles
This day we drove near fifteen miles
Our days drive 12 M's
Go 10 miles
Today, we are 1308 miles from Kanesville
June 6th 30 miles. We are 30 miles nearer California
Estimated our journey today 20 miles
Traviled 20 miles and camped.

Seeing these daily distance notations, some readers of emigrant journals will quickly pass over them thinking they are of little importance. But the more pragmatic and numerically oriented reader will ask such questions as: "How could they know how far it was, since they were traveling through unmarked wilderness?" Or simply "Where did those distance values come from?" There are four possible answers to these questions:

1 They *estimated* the distances.
2 They *measured* the distances.
3 They *extracted* distances from trail guides and maps.
4 They recorded distances *supplied by others.*

Estimation of distances can vary greatly from person to person. Accuracy depends on the skill and experience of the estimator, and, generally speaking, most of us are poor estimators. If I were to ask you to estimate, in feet, the length of a city block or the width of a city street, I would get a wide variety of responses. The answers would range all the way from "I have no idea" to a precise number relatively close to the correct answer.

While reading an emigrant journal, most of us would not be troubled by an estimated distance of sixteen miles for a day's travel even if it were in error by a large percentage. But if we were to see a value such as sixteen and three-fourths miles, that lovely, dangling fraction could trigger the question: "How could this emigrant be so precise, traveling as he was in an 1849 model covered wagon?"

To restate this question in modern, technical terms: "Is it possible that some covered wagons were equipped with onboard computers that could measure the distance traveled to a fraction of a mile?" The answer to this question is, yes, they did have "on-board computers," but they were not known by that name. Rather, they went by names such as "odometer," "viameter," or "roadometer." These machines were simple, gear-driven devices that, computer-like, counted the number of rotations of the wagon wheel. The circumference of the

This odometer was designed and made by Thomas Lowe of Franklin, Idaho, in 1876. It is 29 inches long, 8½ inches wide, and 13¼ inches high. It is ratchet activated and can measure up to six miles. MUSEUM OF CHURCH HISTORY AND ART, SALT LAKE CITY.

wheel and the daily rotation count provided the necessary data required to calculate distance traveled to any degree of accuracy whatever, fractions included.

Odometers occupy a very small space in the history of the early West. For me, however, the study and research I have done in that small space has been very rewarding. Three major surveys of more than 800 museums throughout the United States have been conducted to locate existing odometers. These artifacts are rare, but a number of them have been identified. As I have come to understand the hows and whys of distance measurement in the emigrant period, color has been added to the black and white picture of what it was really like to "go west" in the mid-1800s.

Two years ago I had the privilege of traveling by covered wagon through Death Valley, California. Using an odometer similar to those of the early emigrants, I had the satisfaction of measuring the distances traveled. Similarly, this past spring, I traveled by covered wagon over the Old Spanish Trail in eastern Utah. From these experiences I have learned to appreciate the problems associated with mile measuring under real emigrant conditions. I have learned, firsthand, to more fully appreciate those who measured distances using gear-driven, wheel-rotation counting instruments on their wagons. Some of those who had these devices appear in Sidebar 1.

The length of this list may be surprising to some people. Even so, it is incomplete. It underscores the fact that odometers were rather commonly used during the emigrant period. Typically, an emigrant company would have only one instrument, but in 1849 the Gruwell-Derr wagon train traveling from Salt Lake City to San Bernardino had three odometers. The Hunt and Pomeroy companies that followed the same trail a few days later each had only one.[2] Joseph Hamelin, a member of the Pomeroy company, proudly states in his journal that his odometer was one patented in 1848 by William Oldroyd.[3]

The Corps of Topographical Engineers of the United States Army was an early user of odometers. Sidebar 2 on the next page includes some officers who used them.

In 1849 the Regiment of Mounted Riflemen marched from Fort Leavenworth, Kansas, to Oregon City. Their report provides an interesting example of odometer use. From Fort

Sidebar 1. A Partial List of Emigrant Odometer Users

- William Clayton, 1847—Winter Quarters, Nebraska Territory, to Salt Lake Valley
- Henderson Lewelling, 1847—Salem, Iowa, to Willamette Valley, Oregon
- Joseph Goldsborough Bruff, 1949—Washington, D.C., to Sacramento, California
- Joseph P. Hamlin, 1849—Lexington, Missouri, to Los Angeles, California
- Addison Pratt, 1849—Salt Lake City to San Bernardino, California
- Jessie W. Fox, 1851—Salt Lake City to Fillmore, Utah
- Thomas P. Shrock, 1849—Independence, Missouri, to California
- David Swinson Maynard, 1850—Cincinnati, Ohio, to Puget Sound
- Vincent A. Hoover, 1849—Moline, Alabama, to Los Angeles, California
- Charles Gray, 1849—Independence, Missouri, to San Francisco, California
- Lucian Wolcott, 1850—St. Joseph, Missouri, to California
- Aaron Hardcastle, 1858—Fort Bridger to City of Rocks
- Sammuel Handsaker, 1853—Alton, Illinois, to Oregon City
- Byron J. Pengra, 1853—Illinois to Oregon
- George Belshaw, 1853—Indiana to Oregon
- Philip Condit, 1854—Council Bluffs, Iowa, to Willamette Valley
- John Welsh, 1851—Wisconsin to Oregon
- B.F. Cummings, 1855—Salt Lake City to Salmon River
- John Cobbey, 1850—St. Joseph to Sacramento
- Ezekiel Headley, 1849—St. Joseph to California
- Benjamin Owen, 1853—Missouri to Oregon
- Bazil Longsworth, 1853—Ohio to Oregon
- Lester Hyulin, 1847—Iowa to Oregon
- Henry Lunt, 1850—Salt Lake City to St. George, Utah
- Albert Carrington, 1850—Salt Lake to Washington, D.C.
- Thomas Lowe, 1876—Johnson, Utah, to Moenkopi, Arizona

2 LeRoy R. Hafen, *Journals of The Forty-Niners* (Glendale, Calif.: The Arthur H. Clark Co., 1954), 52.

3 Ibid., 68, 94.

Sidebar 2. U.S. Army Odometer Users

- Lt. George Stevens,1845—Louisiana to the Rio Grande in Texas
- Capt. William H. Emory,1847—Fort Leavenworth to Salt Lake City
- Capt. Howard Stansbury, 1849—Fort Leavenworth to Salt Lake City
- Capt. Randolph Marcy, 1849—Fort Smith to El Paso
- Capt. John W. Gunnison, 1853—Westport, Missouri, to Utah Territory
- Capt. John C. Fremont, 1853—Missouri to California
- Lt. James H. Simpson, 1857—Fort Bridger to Humboldt River
- Capt. William Raynolds, 1860—Yellowstone Exploration
- Lt. James (Jeb) Stuart, 1860—Kansas and Nebraska Territories
- Col. David Fergusson, 1862—Tucson to Gulf of California
- Lt. William Obenchain, 1862—Confederate Army Engineer
- Gen. William T. Sherman, 1865—North Carolina to Washington, D.C.

Leavenworth, Kansas, to Fort Kearny, Nebraska, distances were estimated and recorded primarily as whole numbers. At Fort Kearny an odometer arrived and from that point on, distances were recorded to 1/100th of a mile.[4] What a difference a machine makes!

We all understand what a covered wagon looks like, but a covered wagon with an odometer attached is a new idea to many people. What did emigrant odometers look like, and how did they work? Let me answer these questions in turn.

What did they look like?

Fundamentally, an odometer is a gear-driven device that counts wheel rotations. It is, therefore, a very simple machine that is connected in some fashion to the spokes or axle of the wheel. Anyone with a little mechanical skill could design and build one. Indeed, many early emigrants did design and build their own odometers. Some of these were made of wood. Others were cleverly constructed from such things as canteens and plumb bobs. However, the more sophisticated odometers of the period were made by scientific instrument makers using solid brass components. The common design classified these as pendulum odometers. This type of instrument was used by the Topographical Engineers of the U.S. Army and also by many emigrants.

How does a brass pendulum odometer work?

The precision-made, brass odometer contains a rectangular plate which swings freely around the central axis of a small brass frame. On this plate, two rotating dials are mounted, one overlaying the other. The outer peripheries of the two dials contain 100 and 99 teeth respectively. The gear teeth of both dials mesh with a threaded rod that extends across the central axis of the frame. This assembly is inserted into a circular metal or leather case. When in use, the case is strapped to the spokes of the wagon wheel. As the wheel turns, the free pivoting plate with its two attached dials, pendulum-like, positions itself vertically within the frame. Since the axis of the frame is fixed within the case, and the case is strapped to the spokes, the threads on the axis force one tooth to pass with each rotation of the wagon wheel. Each 100 wheel rotations cause the two dials to make one full turn. The result is an offset of one tooth due to the difference in the number of teeth in the two dials. Each offset, therefore, represents 100 wheel rotations. The total wheel-rotation count for a day can be determined by multiplying the number of offsets by 100 and adding the rotation counts less than 100. Distance traveled is then calculated by multiplying the total rotation count by the wheel's circumference. This type of pendulumodometer can count 9900 wheel rotations. Depending on the wheel size, that number represents approximately twenty-seven and one-half miles.

Many interesting stories surround the early emigrants and topographers who used odometers. The following six accounts are good examples.

4 "The Diary of George Gibbs" in Raymond W. Settle, ed., *The March of the Mounted Riflemen* (Glendale, Calif.: The Arthur H. Clark Co., 1940), 308.

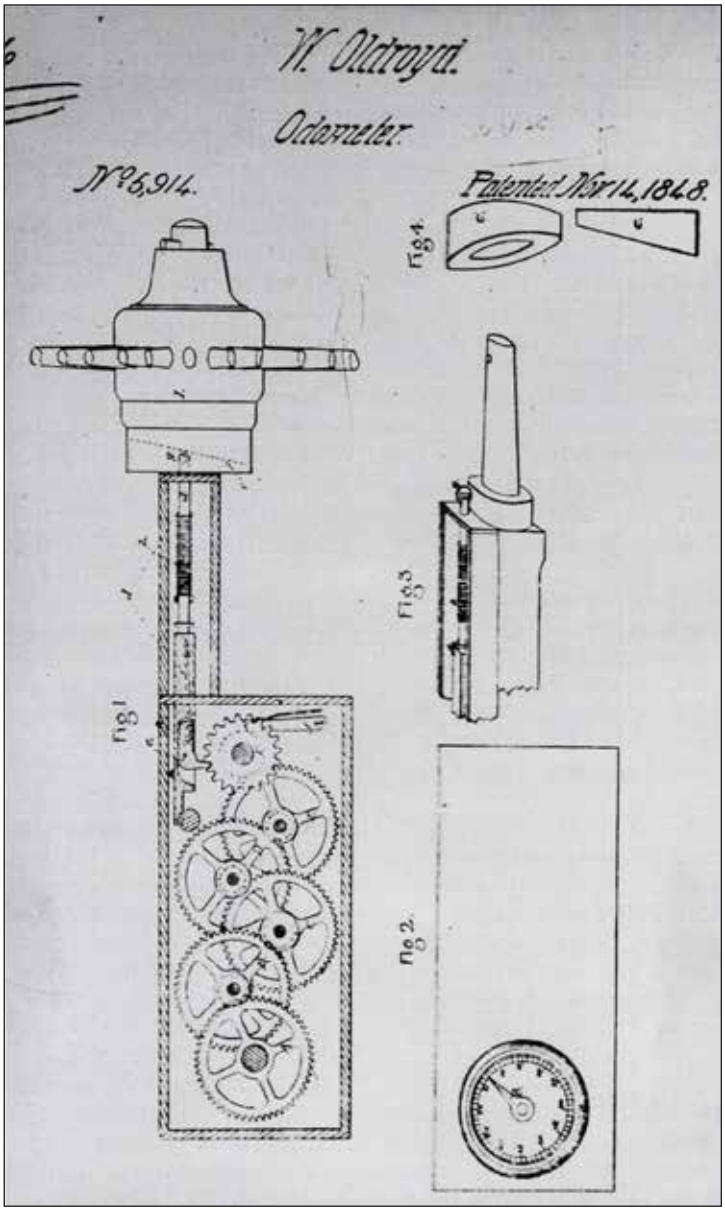
Lt. William H. Emory

In 1846, soon after the outbreak of the Mexican War, Col. Stephen Watts Kearny, who was stationed at Fort Leavenworth, Kansas, received orders to invade and take New Mexico and California. This he did with a military force that included a fourteen-man topographical engineer unit commanded by Lt. William H. Emory. Although Kearny's objectives were purely military, Emory used the long march to collect data which would give the government accurate information about this region, particularly the little-known area between Santa Fe and San Diego. His *Notes of a Military Reconnaissance,* published in 1848, are rife with observations on a wide variety of subjects—plants, animals, geology, weather, native culture, latitudes, longitudes, and of course, the distance from camp to camp. He measured the latter using an imported European odometer called a "viameter." In his personal journal, he made note of the distance measuring task: "May I remark here that every night, I furnish the distances traveled to General Kearny at headquarters."[5]

Two hundred miles south of Santa Fe, where the trail turned west from the Rio Grande Valley, Kit Carson, the intrepid westerner, arrived in camp with news that California had surrendered. Upon learning this, Kearny divided his force of 300 dragoons. One hundred, including Emory's topographical unit, were to continue west to San Diego by pack mule; the remainder, with all the supply wagons, were sent back to Santa Fe. Emory noted the change with regret:

> We parted with our wagons, which were sent back . . . and in doing so, every man seemed to be greatly relieved. With me it was far otherwise. My chronometers and barometer, which before rode so safely, were now in constant danger. The trip of a mule might destroy the whole. . . . The viameter for measuring distances, heretofore attached to the wheel of the instrument wagon, was now attached to the wheel of one of the small mounted howitzers.[6]

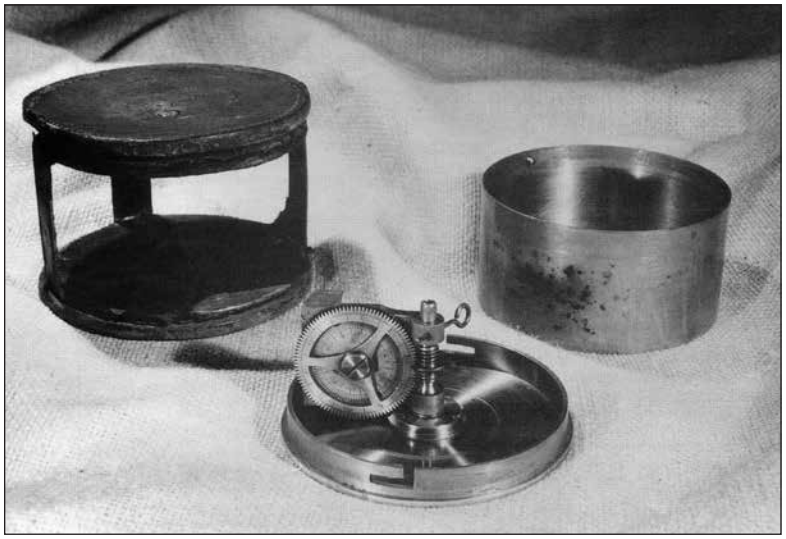
Placing the odometer on a three-foot diameter howitzer wheel was also hazardous. Just one day later, the journal of



Patent drawings of a wagon odometer designed and built by William Oldroyd in 1848. U.S. PATENT OFFICE.

5 U.S. Senate, *Notes of a Military Reconnaissance,* 30th Congress, 1st Sess., Exec. Doc. No. 7 (Washington, D.C.: Government Printing Office, 1848), 47.

6 Ibid., 56.



LEFT A brass pendulum odometer fits inside the brass case at right. The case, in turn, is placed inside the frame. The whole assembly is then inserted into the leather carrier (ABOVE) and strapped to the spokes of the wagon wheel. HENRY FORD MUSEUM & GREENFIELD VILLAGE, DEARBORN, MICHIGAN.

Kearny' s adjutant, Capt. Henry Smith Turner, states: "The instrument for measuring distances [viameter] was lost just before getting into camp—it was attached to a wheel of a Howitzer, and was brushed off in passing through thick bushes."[7]

Perhaps, somewhere on the western New Mexico desert, that odometer still lies half-buried where it fell, for there is no record that it was ever recovered. Despite the loss, distances traveled continued to be recorded until the small army reached San Diego. Emory does not make it clear whether this was done by a replacement instrument or by other methods.

Mormon Pioneer Odometers

Two wooden odometers were designed, built, and used by the first company of Mormon pioneers in 1847. Initially, three men were involved—Orson Pratt, William Clayton, and Appleton Harmon. It was Clayton's particular interest, however, that provided the impetus leading to the odometer's construction and use. Just ten days after leaving the Missouri River, Clayton recorded in his journal: "I walked this afternoon in company with Orson Pratt and suggested to him the idea of fixing a set of wooden cog wheels to the hub of a wagon wheel in such order as to tell the exact number of miles we travel each day. He seemed to agree with me that it could be easily done at a trifling expense."[8]

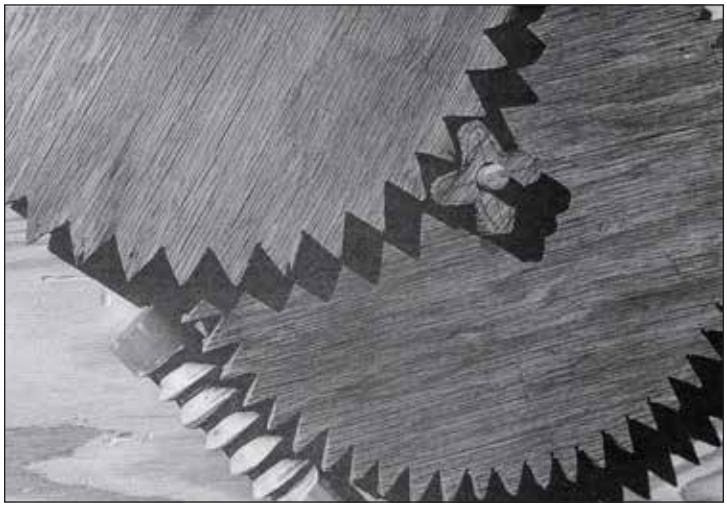
Clayton was dissatisfied with inaccurate estimates of distances traveled each day. He tells us that his estimates were consistently lower than those of others in the company and he was anxious to know "the exact number." Since his suggestion did not involve a vital or immediate necessity, nothing was done.

Three weeks following his conversation with Orson Pratt, Clayton decided the time for action had arrived. He measured the left rear wheel of the wagon in which he was riding and found it to be ideal for his purpose. It was four feet, eight inches in diameter, hence fourteen feet eight inches in circumference (a standard specification used by wheelwrights). Three hundred and sixty rotations of this wheel equaled one mile exactly, "not varying one fraction," wrote Clayton.

On May 8, 1847, near the site of present North Platte, Nebraska, Clayton tied a marker on the spoke of his measured wheel (some sources say it was a piece of red flannel) and walked beside it all day long, tallying each rotation. What a price to pay for accuracy! He tells us frankly that the method

7 Henry Smith Turner, *The Original Journals of Henry Smith Turner,* ed. Dwight L. Clarke (Norman: University of Oklahoma Press, 1966), 84.

8 William Clayton, *William Clayton's Journal* (Salt Lake City, Utah: Deseret News Press, 1921), 83.



LEFT Model of the first Mormon Emigrant odometer showing the threaded-drive-rod (BOTTOM), the one-mile gear wheel (RIGHT), and the ten-mile gear wheel (LEFT). PHOTOGRAPH BY NORMAN E. WRIGHT.

ABOVE Brigham Young's pendulum odometer. It is in a brass case and is shown in its leather carrier. MUSEUM OF CHURCH HISTORY AND ART, SALT LAKE CITY, UTAH.

was "somewhat tedious." At the end of the day he had tallied 4,070 rotations of his measured wheel. For the first time he knew the exact distance they had traveled: ". . . eleven and a quarter miles—twenty revolutions over." It must have been with considerable satisfaction that he learned that his "exact number" was two miles under the estimates given by others for the same day's travel.[9]

Two days later, Orson Pratt, with the approval of Brigham Young, spent the afternoon designing a "roadometer," their name for an odometer. His design was based on the principle of an endless screw or worm gear—a threaded rod that meshes with the teeth of a gear. One complete revolution of the rod would pass one tooth of the gear wheel. If the gear contained sixty teeth and the rod were to rotate once for every six turns of the wagon wheel, then 360 revolutions of the wagon wheel would produce one complete gear-wheel rotation. This would be one mile exactly if Clayton's measured wheel was used as the input driver to the mechanism.

When it was built, a small, four-tooth gear was also placed on the axle of the one-mile gear. These four teeth worked on a third gear containing forty teeth. With each rotation of the mile gear, four teeth of the forty-tooth gear were drawn by, each representing a quarter of a mile. One complete rotation of the forty-tooth gear represented ten miles. The fact that the whole mechanism was encased in a protective box, fifteen by eighteen by three inches, gives us some idea of the size of the gear wheels. To fit within those dimensions, they could not have been larger than ten inches in diameter and not more than one inch thick.

Once the project was underway, it did not take long to complete. Appleton Harmon, a skilled carpenter in the company, was assigned the task of constructing the machine. He began work immediately and six days later, May 16, 1847, the odometer was installed and operating under Clayton's watchful eye. This odometer was successfully used to measure the distance from western Nebraska to the Great Salt Lake Valley.

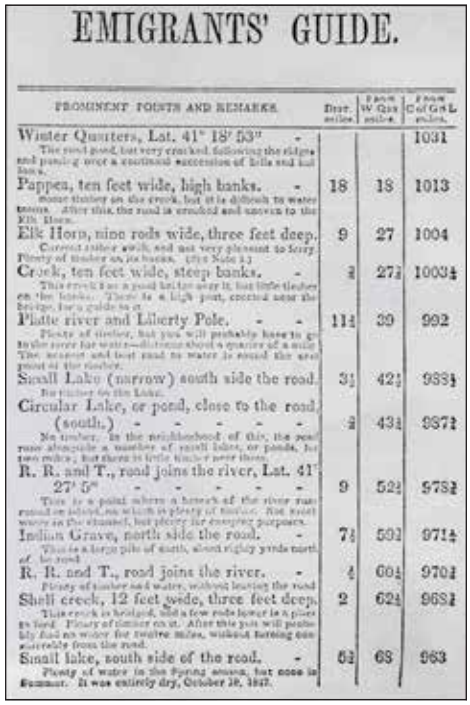
On August 17, 1847, Clayton joined a company that was making the return trip to the Missouri River. He had received instructions from Brigham Young to again measure distances and to make them available "for public benefit." To do this, a new odometer was built which could measure up to 1,000 miles—a 100-fold improvement in measuring capacity. This second machine was built by William A. King, a New England–born craftsman. We know very little about its design, but a number of important clues indicate that it incorporated the basic features of the original.

Arriving at Winter Quarters on the Missouri River, November 21, 1847, Clayton wrote in his journal: "I have succeeded in measuring the whole distance from the City of the Great Salt

9 Ibid., 152–53.

lake to this place, except a few miles between Horse Creek and the A La Bonte River which was taken from the measurement going up. I find the whole distance to be 1032 miles and am now prepared to make a complete travelers guide from here to the Great Salt Lake."[10]

In March 1848 Clayton published *The Latter-day Saints' Emigrants' Guide*. Because of its accuracy, it soon became one of the more respected trail guides of the day for the portion of the western trails it covered.



EMIGRANTS' GUIDE.

PROMINENT POINTS AND REMARKS.	Dist. miles.	From W. Gus miles.	From Col'd'L miles.
Winter Quarters, Lat. 41° 18' 53" -			1031
The road good, but very crooked, following the ridges and passing over a continued succession of hills and hollows.			
Pappea, ten feet wide, high banks. -	18	18	1013
Some timber on the creek, but it is difficult to water cattle. After this, the road is crooked and uneven to the Elk Horn.			
Elk Horn, nine rods wide, three feet deep.	9	27	1004
Correct rather swift, and not very pleasant to ferry. Plenty of timber on its banks. (See Note 13			
Creek, ten feet wide, steep banks. -	½	27½	1003½
This creek is not a good ford, but very little timber on the banks. There is a high post, erected near the bridge, for a guide to it.			
Platte river and Liberty Pole. - -	11½	39	992
Plenty of timber, but you will probably have to go to the river for water—distance about a quarter of a mile. The nearest and best road to water is round the west point of the timber.			
Small Lake (narrow) south side the road.	3½	42½	989½
No timber on the Lake.			
Circular Lake, or pond, close to the road, (south.) - - - - - -	½	43½	987½
No timber. In the neighborhood of this, the road runs alongside a number of small lakes, or ponds, for two miles; but there is little water near them.			
R. R. and T., road joins the river, Lat. 41° 27' 5" - - - - - -	9	52½	978½
This is a point where a branch of the river runs round an island, on which is plenty of timber. The road runs on the channel, but plenty for emergent purposes.			
Indian Grave, north side the road. -	7½	59½	971½
This is a large pile of earth, about eighty yards north of the road.			
R. R. and T., road joins the river. -	½	60	970½
Plenty of timber and water, without leaving the road.			
Shell creek, 12 feet wide, three feet deep.	2	62½	968½
This creek is bridged, but a few rods lower is a place to ford. Plenty of timber on it. After this you will probably find no water for twelve miles, without having ascertained from the road.			
Small lake, south side of the road. -	6½	68	963
Plenty of water in the Spring season, but none in Summer. It was entirely dry, October 10, 1847.			

The Latter-Day Saint Emigrants' Guide of the Mormon Trail, published by William Clayton in 1848.

Henderson Lewelling

In 1847 Henderson Lewelling,[11] a Quaker from Salem, Iowa, proposed to move his very successful nursery business to the Oregon Territory. He procured a stout wagon and built two rectangular boxes twelve inches deep. When placed side by side these boxes filled the wagon completely. The boxes were then filled with rich Iowa soil, and in them he planted 700 small fruit trees of the best varieties. Lewelling' s "traveling nursery" was an unusual sight as it made its way west on the Oregon Trail. Not so unusual, however, was the fact that this determined and meticulous Quaker also attached an odometer to the wheel of one of his wagons. He faithfully recorded the distances of each day's journey and the important events that transpired.[12]

On July 10, 1847, Lewelling and his unusual cargo were ferried across the Platte River in central Wyoming. On that day, one of the ferrymen was Appleton M. Harmon, the same man who had built the first Mormon emigrant odometer. In his journal entry of that day, Harmon noted the passage of Lewelling, the nursery wagon, and its attached odometer.[13]

Lewelling's journey to the Columbia River was made without incident since the Indians believed in the sacredness of trees and that the Great Spirit must be with someone who was carrying them in his wagon.[14] At the Columbia River, Lewelling built barges and floated down the last leg of the journey, finally establishing himself in the Willamette Valley of Oregon. Thus began the fruit industry of the Pacific Northwest.[15]

Joseph Goldsborough Bruff

J. Goldsborough Bruff of Washington, D.C., was one of those caught up in the gold fever of 1849. A former West Point cadet, Bruff organized the Washington City and California Mining Association, a group of sixty-six men in uniform, highly organized, and well equipped. They left Washington, D.C., on April 2, 1849, and two weeks later arrived at St. Louis, where a high-quality brass odometer was ordered from Jacob Blattner, an instrument maker. Nineteen days later, the odometer arrived at their camp in St. Joseph, Missouri.[16]

As they moved west, Bruff used his odometer to check the route against the trail guide books he had purchased and was quick to note their discrepancies. At Soda Springs, in present south-eastern Idaho, his men voted to take a cutoff that

10 Ibid., 376.

11 In many records the family name is spelled Lewelling, and his brother Seth used that spelling. According to Henderson's son Alfred, the spelling had been changed from the original Welsh spelling (Luelling) by Henderson and Seth's father, prior to Henderson's birth; but Seth reverted to the original spelling later in life. James Robert Cardwell, "The First Fruits of the Land (Part 1)," *Oregon Historical Quarterly* (1906), 7.

12 Harriet Jane Luelling, "Bringing the Travelling Nursery Across the Plains," compiled from letters written by Alfred Luelling and others interested in the history of the Luelling family. Typescript, Luelling–Campbell Family History and Genealogy, 1929, 7–8.

13 Appleton Harmon, *The Journals of Appleton Milo Harmon: A Participant in the Mormon Exodus from Illinois and the Early Settlement of Utah, 1846–1877,* ed. by Maybelle Harmon Anderson (Berkley, Calif.: The Gillick Press, 1946), 40.

14 Luelling, "Travelling Nursery," 12.

15 Ibid., 6–7.

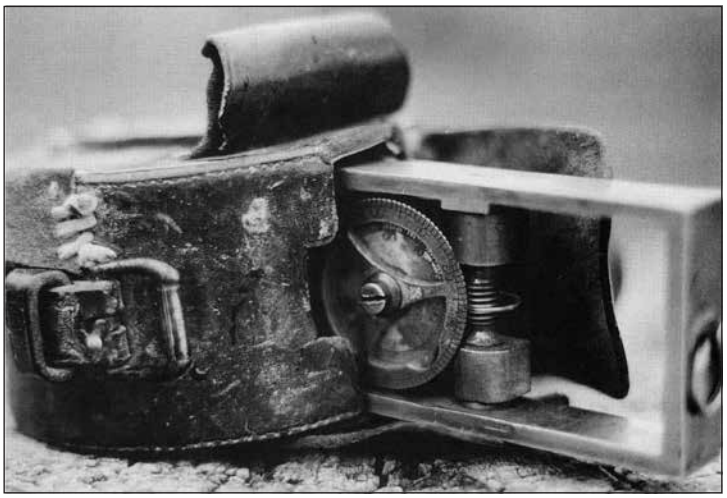
16 J. Goldsborough Bruff, *Gold Rush: The Journals, Drawings, and Papers of Goldsborough Bruff,* ed. Georgia W. Read (New York, N.Y.: Columbia University Press, 1949), 4, 6.

would bypass Fort Hall on the Snake River. Sometime later Bruff's journal contained the following entry: "The distances traveled by the company, measured by an excellent odometer . . . show that the cut-off is no cut-off at all . . . [being] 132¼ miles. And between the same points, via Fort Hall, the distance has been computed at 134 miles."[17]

Bruff records that many other emigrant companies had confidence in his judgment since he measured distances with an odometer. At an unmarked trail junction in northern Nevada, a number of emigrant trains waited for Bruff's arrival to see whether the junction was the beginning of the Lassen Trail. When he arrived, Bruff set them straight, explaining that his odometer had measured every inch of the way and that there was still one more day of travel to the correct junction.[18]

Bruff was keenly aware of odometers and odometer users. Whenever he saw them they were noted in his journal: "I became acquainted here with a Mr. Wm. Ashford who had a cart and yoke of oxen. He very ingeniously constructed a simple odometer and attached it to the wheel of his cart. It was a rough wooden box containing a tin canteen within which was a tap, brass plumb and two wooden cog wheels. It was quite correct on level ground and answered all of its authors desires."[19]

While on a high mountain pass of the Lassen Trail, Bruff wrote, "The level spot here is not over 100 yards broad and 400 feet long. Here we corralled the wagons and camped. The remains of several burnt wagons and part of a discarded brass odometer was lying in the road."[20]



The pendulum odometer and leather-covered metal case used by Capt. John Gunnison of the Corps of Topographical Engineers in his 1853 transcontinental railroad survey. MUSEUM OF PEOPLES & CULTURES, BRIGHAM YOUNG UNIVERSITY, PROVO, UTAH.

The story of the Washington City and California Mining Association trek to California came to an effective end in October 1849, when their teams gave out in the early winter snows of the Sierra Nevada north of Sacramento. Here, Bruff volunteered to remain with the company property while the others moved on to the settlements. In this lonely winter camp, he summarized the accumulated distance data of the journey. "Looking over my notes, I find that we have traveled 2061 miles from the Missouri River in 120 days being 17–1/6 miles per day."[21]

Bruff spent the winter of 1849–50 in his mountain camp under very trying circumstances, narrowly escaping starvation. When spring finally came, he made his way to the gold fields and attempted to make his dream of fortune a reality. Failing in this, he returned to Washington, D.C., by boat across the Isthmus of Panama in the summer of 1851.[22]

Captain John W. Gunnison

In 1853 Capt. John W. Gunnison, another topographer, was assigned to lead one of the four surveys that Congress authorized to determine the most feasible route for a transcontinental railroad. Gunnison's route of investigation lay along the 38th Parallel from city of Westport, Missouri, by way of the Arkansas River and the Great Salt Lake, to the Sierra Nevada. The distances traveled were measured by an odometer attached to the wheel of one of the supply wagons. This particular instrument has an unusual history.

17 Ibid., 620.
18 Ibid., 142.
19 Ibid., 192.
20 Ibid., 182.
21 Ibid., li.
22 Ibid., 205–334.

On the morning of October 25, 1853, a detachment of the main survey party was camped on the banks of the Sevier River in central Utah. During breakfast, a sudden burst of arrows and gunfire left eight of the twelve men dead, including Captain Gunnison. News of the massacre spread rapidly, but on returning to bury the dead, a rescue party found that the Indians had taken all of the topographical notes, so meticulously prepared over the previous six months, and also all of the precious instruments.[23]

Three weeks later, a Salt Lake City newspaper printed the following item concerning Dimick B. Huntington, who had been sent by Gov. Brigham Young to deal with the Indians: "We stop the press to announce the following. Mr. Huntington arrived [in Salt Lake City] from his trip after the government property which was lost in the late massacre. . . . He reached Fillmore [Utah] . . . on the 3rd instance and there found . . . the Corn Creek Pauvan Chiefs, who had recovered [from participants in the massacre] . . . the notebooks of the party and all the instruments except the odometer."[24]

The statement, ". . . all the instruments except the odometer," is the connecting link to a continuing story.

Two Utah pioneers were later riding horseback on an old Indian trail some seventy miles north of the massacre site. On the trail, in its leather case where it had fallen or been discarded, lay an odometer, undoubtedly the one that belonged to the Gunnison party. It is, today, a fascinating museum artifact that provides a tangible link to the use of odometers in western history.

Following Gunnison's death, Lt. Edward G. Beckwith took command and completed the central survey. When the transcontinental railroad was built in 1869, his recommended route along the 41st Parallel was used.

Captain William F. Raynolds

In 1860 Capt. William F. Raynolds of the U.S. Army Corps of Topographical Engineers, was assigned to explore and survey the headwaters of the Yellowstone River. Guided by the indomitable Jim Bridger, the expedition made its way down the Gros Ventre Fork of the Snake River, east of Jackson Hole, Wyoming. Here the large, two-wheel rig they were pulling for the purpose of measuring distances became a problem. Raynolds's journal documents the difficulties:

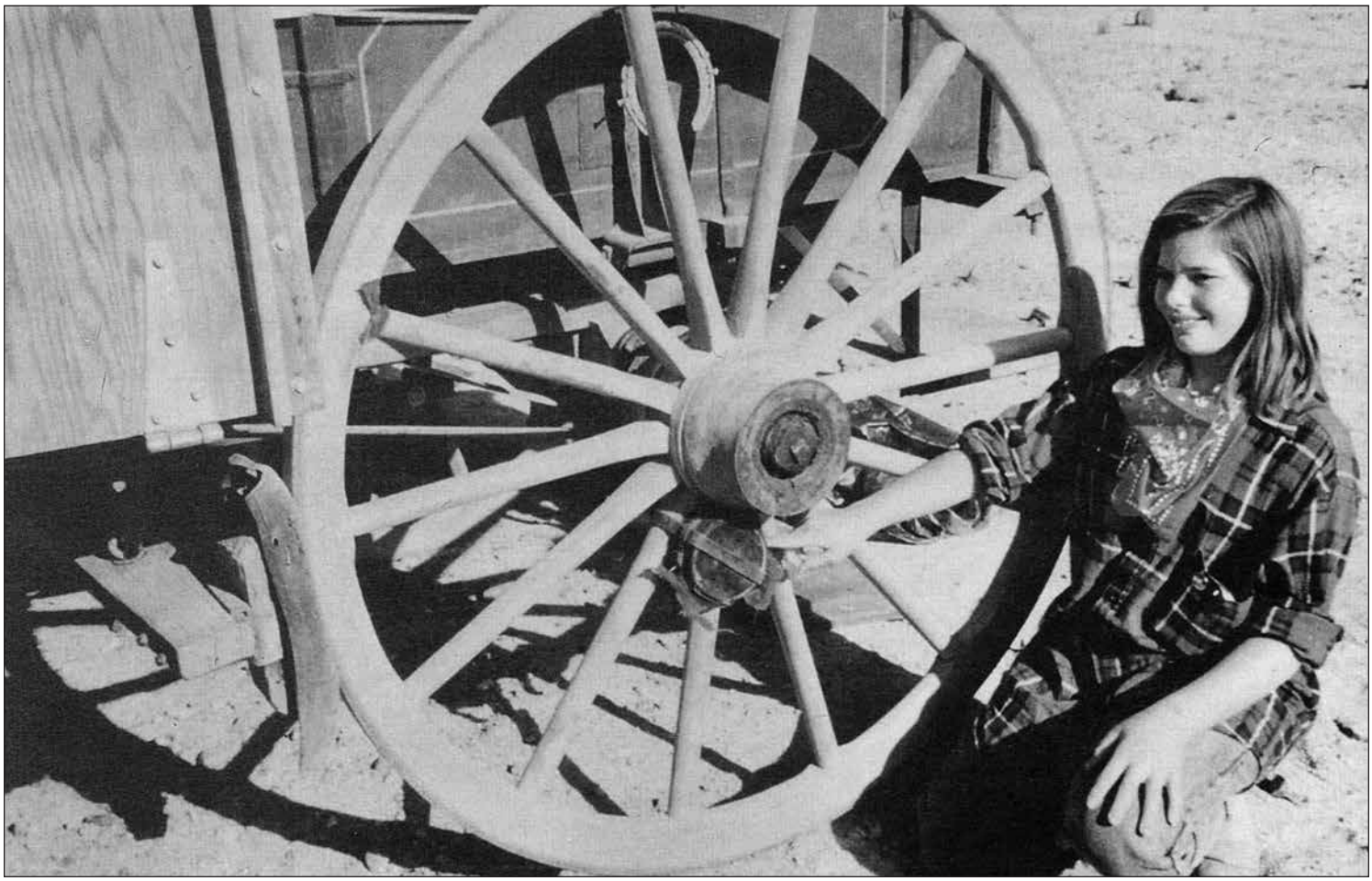
> May 26th We were compelled to cross a bold spur covered with large granite boulders. It was the first serious difficulty we encountered with the pair of wheels we use for the odometer and the aid of the men was found necessary to keep the wheels upright.
>
> May 28th The large boulders on the hillside made traveling so bad that I ultimately gave orders to leave our odometer wheels behind, [however] as I was anxious not to give up the odometer measurements, I sent back for the wheels after getting into camp and they were brought in just before dark.
>
> June 1st We reached a bank 100 feet high above the stream bed. A narrow path lead over it along which our pack animals passed in safety. But, the odometer wheels could not be kept upright even with the aid of ropes. Soon they rolled over and down the slope carrying the mules with them and coming at last to the waters edge.
>
> June 4th The spirit of insubordination and discontent was manifest among the men showing itself openly in their apparent determination to abandon further efforts to bring along the odometer wheels which they permitted to turn over five times in about a half mile. It was with greatest difficulty that I succeeded in enforcing discipline.[25]

Reaching the east bank of the Snake River with the odometer wheels in tow, the difficult task of crossing during the high spring run-off was begun. This required one full week and was accomplished using an improvised boat built by Bridger. But what happened to those pesky odometer wheels? The captain's journal supplies the answer: "June 16th We resumed operations this morning . . . ten trips were made and all persons and effects were ferried across save the odometer wheels which I

23 J. Schiel, "Journey Through the Rocky Mountains & the Humboldt Mountains to the Pacific Ocean," in Nolie Mumey, *John Williams Gunnison* (Denver, Colo.: Artcraft Press, 1955), 91

24 "Postscript," *Deseret News,* Salt Lake City, Utah, November 12, 1853.

25 U.S. Senate, *Report of the Secretary of War,* 40th Cong., 1st Sess., Exec. Doc. No. 77 (Washington, D.C.: Government Printing Office, 1868), 84, 85, 88, 89.



On a covered wagon trip through Death Valley in 1992, the author measured distances using an odometer similar to those used by the early emigrants. The girl in the picture is pointing to the odometer attached to the wheel. PHOTOGRAPH BY NORMAN E. WRIGHT.

have decided to abandon, as the attempt to bring them across would be attended by too great a risk."[26]

Although the danger of ferrying the odometer wheels across the river was very high, one of his men willingly responded to the challenge: "June 17th Mr. Alexander, my foreman, attempted to bring the odometer wheels across on a raft but failed and was compelled to abandon them in the middle of the stream."[27] Only the odometer wheels were lost, not the instrument itself. Precise distance measurements resumed when the expedition later obtained wagons.

Conclusion

I suggest that the next time you get into your automobile, briefly pause before you put the key in the ignition. Give a respectful glance at the odometer on your dashboard. Reflect on the fact that it is one of the world's most widely used counting instruments. Above all, remember that the odometer is perhaps the oldest gear-driven counting instrument known to man and that the one on your dashboard differs very little from the odometers used by the early explorers and emigrants of the American West. OJ

26 Ibid., 95.
27 Ibid., 96.