



Buffalo

Where Grain Elevators Were Born

All the waters of the upper Great Lakes push past Buffalo as they flow under the Peace Bridge and down the Niagara River to Lake Ontario. Looking at a map of North America, you might imagine that a ship launched on the north shore of Lake Superior could sail down the Great Lakes and on through the St. Lawrence River to the sea. That imagined trip can't happen. Roughly halfway down the Niagara River between Lake Erie and Lake Ontario is one immense, magnificent obstacle—Niagara Falls. As long as there was no way to avoid Niagara Falls, Buffalo held a key geographic advantage. From the west, it was the last stop before the Niagara River. From the east, it was the jumping-off place where settlers could sail west to Ohio and beyond. But that advantage wasn't fully realized until there was an easier way to travel between Buffalo and the East Coast. A water route from Buffalo to New York would provide that route, but it didn't appear until 1825.

On Wednesday, October 26, 1825, at ten o'clock in the morning, a cannon was fired in Buffalo. Its sound traveled east to start a string of cannon fire along the whole length of a newly built canal and, when it reached Albany, the cannon sound was carried on down the Hudson River to New York City. At twenty minutes past eleven o'clock that same morning, the cannon relay reached Fort Lafayette

in New York harbor and a grand salute was fired. As the salute ended, the relay was repeated westward, up the Hudson River and along the new canal to Buffalo. The Erie Canal was officially open.

It had taken more than eight years of hard manual labor to dig the canal and create the bridges, aqueducts, and locks that made the 363-mile trip from Albany to Buffalo by water possible. Governor DeWitt Clinton had broken ground for the construction of the canal on July 4, 1817. Clinton had failed to get federal financing for the project but managed to obtain money for the seven million dollar cost of construction by issuing New York State–backed bonds. It was a bold and innovative move that proved a good gamble. The bonds were quickly repaid from tolls collected from canal travelers, and canal traffic grew to be greater than its planners ever expected.

The canal was dug from east to west and, as it approached Lake Erie, a fierce argument arose about its western terminus. Clinton wanted the canal to end in Buffalo, but he was maneuvered out of his seat on the Erie Canal Commission in April 1824 by his political opponents. For a time, it looked as if the promoters of Black Rock (a site north of Buffalo) would succeed in making that town the western end of the canal. There were good arguments for Black Rock. It had a better natural harbor than Buffalo and already handled more lake freight traffic. Buffalo, on the other hand, had no real harbor and its waterfront was exposed to dangerous waves from Lake Erie.

As the arguments went back and forth, Buffalo found itself playing defense. Both Buffalo and Black Rock had been burned to the ground by British troops in the War of 1812. Eleven years after the end of the war, memories of the conflict still lingered. That didn't help Black Rock, since its location on the Niagara River north of Buffalo exposed it to cannon fire from Fort Erie in Canada. That worry might have been set aside, but two other considerations finally tipped the balance in Buffalo's favor.

The first was the initiative taken by Buffalo merchants. In 1820, under the leadership of Samuel Wilkeson, Buffalo merchants had a channel dug out of the mouth of the Buffalo Creek and built a pier to protect the harbor that the channel created. (This protection was later supplemented by a series of breakwaters that created the Erie Basin Marina and expanded the city's harbor area.) The second factor

was more technical and practical. Four of the five canal engineers who were in charge of the project wanted the canal to end at Buffalo. The water level was higher in Buffalo and more likely to feed the canal. Since Black Rock was slightly down the Niagara River from the lake, getting ships in and out of its harbor presented difficulties. After unloading, ships would have to work back into Lake Erie against the current of the river. And finally, Black Rock Harbor was vulnerable to damage from ice drifting in from Lake Erie. The last concern proved justified by extensive ice damage to Black Rock harbor in both 1824 and 1825.

Buffalo was finally chosen as the western terminus of the canal, and the canal engineers probably deserved credit for that decision. But the initiative of the Buffalo merchants is remembered as the reason for victory. Samuel Wilkeson is buried in Buffalo's Forest Lawn Cemetery along with other distinguished citizens of the city. The Latin inscription on his tombstone honors him for the creation of Buffalo's harbor and for guaranteeing Buffalo's growth into a thriving urban center. It reads: *Urbem Condidit*, "He Built the City."

DeWitt Clinton's fortunes revived after Buffalo's success. Indignation over his removal from the Erie Canal Commission was so great that the Peoples Party made him their candidate for governor of New York (his own party had not nominated him for reelection) and he again became governor in 1825. That gave him the opportunity to savor the completion of the canal he had envisioned and made possible. To attend the October 1825 opening of the Erie Canal in Buffalo, he and a large delegation traveled along the canal in the Seneca Chief all the way from Albany. After the opening ceremony in Buffalo, Clinton took the return trip down the canal and the Hudson River to New York City. When he got there, he poured two casks of Lake Erie water into the ocean water of New York harbor and set off another celebration. The *Niles Weekly Register* claimed that the celebration included banners, ornamentation, parties, and balls "the like of which never has before been witnessed in America."

The obvious symbolism of Clinton's celebratory trip was that the canal ran two ways. That two-way travel promoted enormous growth at both ends. Buffalo grew suddenly from a town of about 2,400 to a city of more than 42,000 by 1850. At the same time,

New York City grew to displace Philadelphia as the biggest shipping port on the Atlantic coast of the United States. Settlers could now move easily and cheaply from the East Coast to establish a new life in the western United States and, eventually, the products from their farms could find a convenient way to eastern markets.

In truth, the movement of farm products from the West developed slowly. The Erie Canal carried more people than goods in its earliest days. In 1828, the schooner *Guerriere* brought 2,500 bushels of wheat from the West, but there was no demand for it in Buffalo and it was not forwarded down the canal to New York but sent farther along the south shore of Lake Erie to Dunkirk. Part of the reason for the disappointing reception of the *Guerriere* was that moving grain from the lake to the canal wasn't easy. The original Erie Canal was forty feet wide and four feet deep. The largest boat able to manage in the canal could carry no more than thirty tons of grain. Wheat weighs about sixty pounds a bushel, so the *Guerriere's* cargo would have filled two canal boats and half of another. It would also have to be moved from lake boat to canal boat manually, and that was hard work. Every bushel of bulk grain would have had to be drawn up from the cargo hold of the lake boat by block and tackle, one barrel at a time. It would then have to be weighed with a hopper and scales and either swung over the ship's side into the hatch of a canal boat or carried in baskets to a warehouse for later loading into a canal boat. This was the method employed for many years and, by this method, if the weather was good, a team of workers over a long, steady, and hard-working day could remove about eighteen hundred to two thousand bushels of grain from a lake boat. Unloading the *Guerriere* would have taken more than a day.

Despite these discouraging difficulties, it still made sense to move grain through Buffalo and down the Erie Canal to New York City and on to other eastern markets. The alternative was to send Western grain down one of the rivers that fed into the Mississippi and on down that river to New Orleans where it could be loaded on a ship for the voyage around Florida to markets on the East Coast. That trip took about three months and provided many opportunities for the grain to be lost or spoiled. It also carried a cost of about \$100 a ton. Transportation costs for shipping via the Erie Canal were

about \$10 a ton and the grain would get to market more quickly with less chance of loss. Once the choice of the Erie Canal route through Buffalo was clear, the city began a steady climb toward grain shipping dominance.

By 1841, grain was arriving in Buffalo at the rate of two million bushels a year. Since, grain was still shifted by hand from lake boat to canal boat, demand for workers was high. Irish immigrants who arrived in the United States around this time were told that they could always find work in Buffalo. As long as this work was done manually, unloading for each boat was fixed at a top rate of eighteen hundred to two thousand bushels a day.

The lake ships now arriving in Buffalo were much bigger than the *Guerriere* and they lined up in Buffalo harbor waiting their turn to be unloaded. It seemed to Joseph Dart, a Buffalo merchant, that there must be a better way. The manual method of unloading grain, barrel by barrel, was too costly and too slow. What was needed, in Dart's opinion, was an effective and efficient mechanical method of removing the grain from a lake boat into a storage facility and out again into the canal boats.

Dart had been born in Connecticut and moved to Buffalo when he was twenty-two years old to become a retail merchant in the hat and fur business. He seems to have been, in every way, a practical and clear-headed man. It must have seemed strange, therefore, when this retail merchant began to puzzle over the delay suffered by the grain ships in Buffalo harbor or to imagine that he could find a mechanical way to move that grain. Mahlon Kingman, a forwarding merchant in Buffalo, had tried and failed to use an elevating device operated by horse power to remove grain from a lake boat into a building on the Evans Canal in Buffalo. He couldn't make it work. That prompted Dart to build a different device, but Kingman wasn't encouraging. He tapped Dart on the shoulder and said, "Dart, I am sorry for you; I have been through that mill; it won't do; remember what I say: Irishmen's backs are the cheapest elevators ever built."

What Kingman might not have known, and Dart did, was that the mechanics of elevating grain out of a ship into a building had already been conceived and accomplished. The third patent issued by the U.S. Patent Office was granted to Oliver Evans in December

1790. It was for an automated flourmill—a remarkable device able to process wheat delivered to a water-powered mill into flour automatically. First, wheat was dumped into a hopper; then, without any intervention from a worker, it was turned into flour that was bagged and ready to use. Evans's invention was so revolutionary that even when neighboring millers saw the mill in operation, they dismissed it as impossible and declared it "a set of rattle traps, not worth the notice of men of common sense." A few years later, when the device proved to be remarkably successful in the Ellicott mills of Baltimore, the same dismissive Brandywine millers of Delaware wanted to adopt the invention without paying Evans license fees and challenged his patent on the grounds that it was based on obvious and antique methods. Evans was able to defend his patent, but the cost and expense of litigation took a toll on the self-taught Delaware farm boy.

In 1792, Evans moved to Philadelphia where he published *The Young Mill-Wright and Miller's Guide* in 1795. By 1860, it had gone through fifteen editions. The book explained the principles and operation of his automated flourmill in detail. In one of the editions, he included a plate illustrating his mill. On the left hand side of the illustration, there is a ship docked next to the mill. The ship contains a load of grain, and an elevating device extends down into the ship. The device is an endless strap revolving around two pulleys. The bottom pulley is set in the grain that is to be hoisted into the mill from the hold of the ship. A series of buckets on the strap scoop up the grain and move it to the top where it is emptied into the mill as each bucket passes over the top pulley. Evans called this piece of his machine an "elevator" and the device in the illustration is a rudimentary version of what Dart would call a "marine leg." This elevator was the mechanical key to the fast and effective method of unloading grain that Dart was looking for and Dart, with the engineering help of Robert Dunbar, turned it into a commercial success. In doing so, the device that performed the elevating part of the process gave its name to the whole structure and operation, and the "elevator" was born.

Dart's elevator was finished in 1843. The elevator building was wooden and the elevator machinery was powered by a high-pressure steam engine of the sort that Oliver Evans had gone on to design later in his life. The elevator's storage bins held 55,000 bushels of

grain, and the elevator was an immediate commercial success. Within three years, the capacity of the elevator had doubled, making Mahlon Kingman confess: "Dart, I find I did not know it all."

The schematic drawing in Fig. 1.1 shows the operation of Dart's elevator in simplified form.

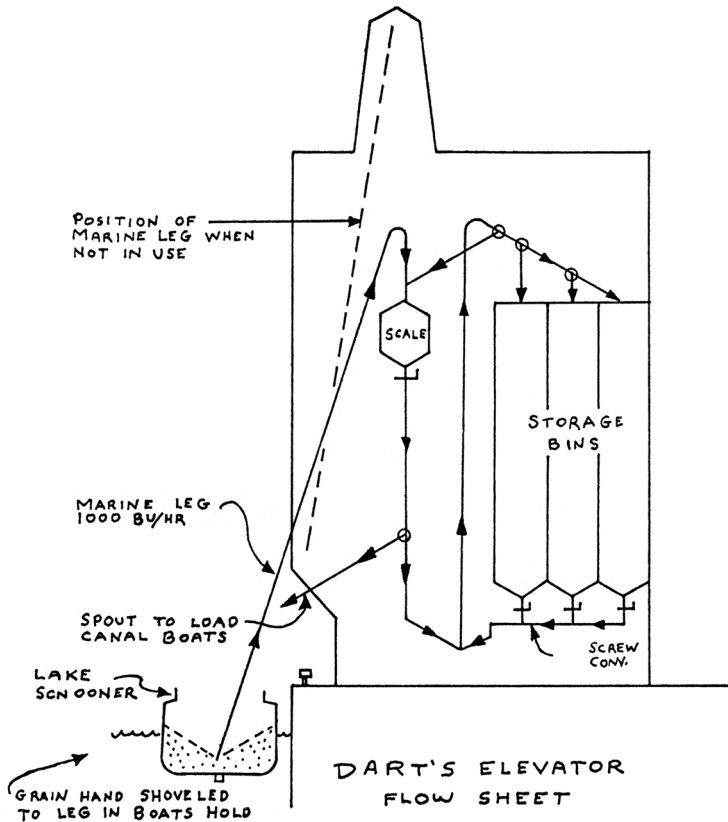


Figure 1.1. Schematic Drawing of Dart's Elevator. This drawing shows the operation of Dart's elevator, including two "legs." One is the labeled Marine Leg that lifts the grain out of a lake schooner. The other is an unlabeled leg that lifts the grain internally. A "leg" is another name for the belt and scoop lifting device that is basic to the workings of an elevator. This elevating device gives the "elevator" its name. Courtesy of Buffalo History Museum, used by permission.

Dart acknowledged his debt to Evans when he addressed the members of the Buffalo Historical Society on March 13, 1865. Evans, he said, deserves a place beside Robert Fulton and Eli Whitney as an inventive genius and benefactor of the commercial and industrial life of the United States. Later in the same speech, he called Evans “the Watt of America.” By the time that Dart gave his address, there were twenty-nine working elevators in Buffalo, twenty-seven on land and two floating in the harbor. Together they could hold six million bushels of grain and were able to move in a day more grain than had come into Buffalo in the year that Dart built his elevator.

Dart wasn’t as forthcoming in his credit to Robert Dunbar whose engineering skills and experience were essential to the building of Dart’s elevator. That was probably the result of Dart’s effort to obtain a patent for the invention of the grain elevator and his reluctance, therefore, to have Dunbar pictured as a participant in the invention. In the end, no patent was granted. Dart reaped the financial returns from the operation of his elevator, and Dunbar seemed satisfied to profit from designing elevators for others.

Perhaps Dart had worried too much about Dunbar. He seemed a man unlikely to challenge Dart or claim a part in his patent application. A contemporary described him as a man of “a singular retiring and undemonstrative disposition.” Little is known of him beyond his having been born in Scotland in 1812 and having been trained as a mechanical engineer in Canada. After his engineering training, he moved to Buffalo in 1834. He would have been twenty-two years old—the same age that Dart was when he moved to the city. How Dart and Dunbar met is unknown, but somehow Dart had the sense to recognize Dunbar’s engineering talent and to engage him in his elevator-building project. After playing a major role in the design and building of Dart’s elevator, Dunbar went on to design most of the early elevators that were built in Buffalo. He became so well known as a grain elevator designer that he was sought out to design elevators and to supervise their construction far beyond Buffalo in Canada and Europe.

Whether Dart deserved a patent is still debated. He had found a different application for Evans’s invention and turned what Evans had conceived as part of a manufacturing process into a process for the commercial transfer of grain. But since no patent was issued,

the field was open to others to build grain elevators in the United States, Canada, and overseas without acknowledging or paying Dart. And build them they did.

In 1847, grain elevators were built in Toledo, Ohio, and Brooklyn, New York. Elevators in Toledo, Buffalo, and Brooklyn created a natural loop. Grain grown in Ohio traveled to Toledo to be processed and stored in the Toledo elevator. It was then loaded onto lake boats and shipped to Buffalo for transfer via the Buffalo elevators and the Erie Canal to New York City. The Brooklyn elevator received and stored grain for later distribution to East Coast flourmills and to grain consumers in England, the Netherlands, and Germany.

By 1900, a postcard picture of Buffalo harbor shows a busy grain trading port. Lake boats deliver their cargo of grain to the elevators, while tugboats pull barges loaded with grain up the Buffalo River on their way to the Erie Canal. Smokestacks rise above the plants that power the elevators, which are all built of wood in the style of Dart's original.



Figure 1.2. This photograph shows some of Buffalo's early wooden elevators. They stretch from the foot of Main Street along the Buffalo River. A lake boat is docked at the Eastern Elevator (the second on the left) and a tugboat in the foreground pulls a loaded canal barge along the river. The smokestacks beside the elevators show that they are steam powered. Courtesy of Library of Congress Prints and Photographs Division. LC-DIG-det-4a07180.

The successful operation of this Toledo-Buffalo-Brooklyn loop encouraged more and more settlers to establish themselves on farms in the West. This, consequently, led to the creation of similar loops that included more and more cities. Elevators appeared in Cleveland, Chicago, and Duluth as grain farming moved west. The same process worked in Canada, although Canadian shipping routes to the East were inserted in the Canadian loop. But a great deal of Canadian grain was shipped through Buffalo. It would be sent in bond through Buffalo and out of United States ports on the East Coast, thus avoiding custom duties that would otherwise have been levied on grain imported into the United States.

There was, of course, a natural limit to the westward extension of elevators in this grain-shipping loop. Lake Superior is the most westerly of the Great Lakes and, therefore, its north shore is as far west as a lake boat can reach. Duluth sits on the southwestern tip of the north shore of Lake Superior and Thunder Bay lies roughly on the lake's north shore mid-point. The establishment of elevators in those cities was inevitable. Both cities, therefore, became and remain major grain shipping ports. In their respective countries, they represent the farthest reach west of the commercial loop in grain shipments reaching eastern North American markets and beyond.

Buffalo, because of changes in shipping patterns, has seen its role in the grain shipping trade diminish. Grain production and shipping, however, continue. In order to follow the development of grain elevators it is necessary to move away from the story of the invention of terminal grain elevators to an account of their development and to what it takes to make them work.