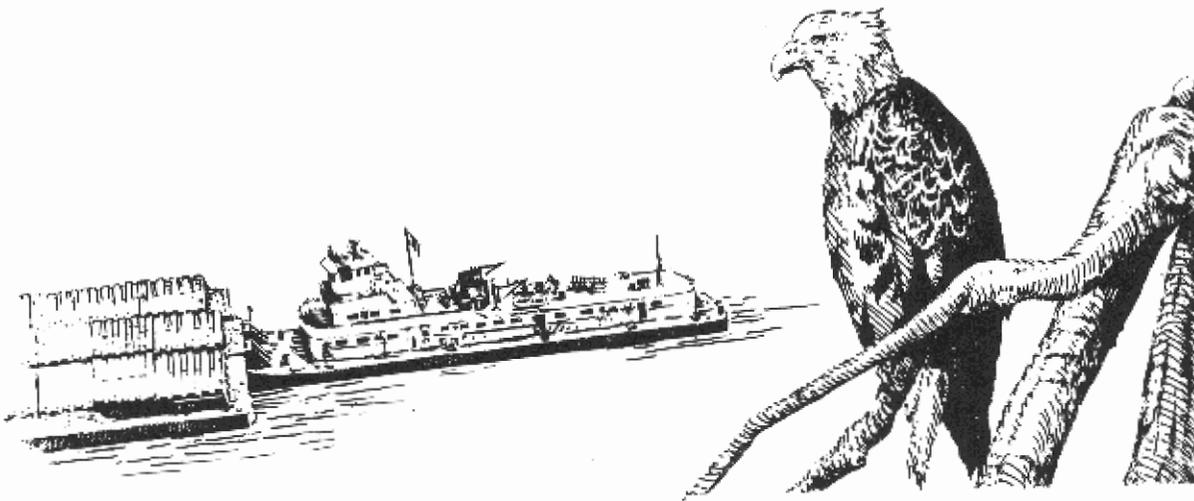


Chapter 1

The Steamboat Versus the Western Rivers



Nature was at her most perverse when she designed American rivers, After spreading a grand network of main stems and tributaries across the whole United States east of the Great Plains, she filled nearly every channel with such an assortment of snags, sandbars, shoal waters, rocks, rapids, and cross currents as to make navigation all but impossible for much of the year, and dangerous the rest of the time.

The Louisiana Purchase in 1803 highlighted this perversity. A seemingly limitless country lay waiting to be settled, with no good way of getting there. A few wagon trails could be made with great difficulty, but a system of roads seemed far away in the early 19th century. Meanwhile, there were the ready made Western rivers, free to everyone, barring the obstacles in their channels. Consequently, the first task facing the westward movement was the improvement of navigation.

Such improvement took place in two stages. American inventors and tinkerers first applied

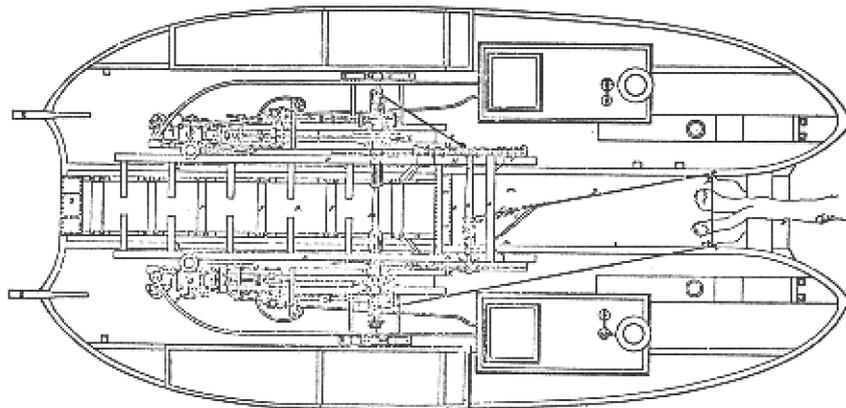
THE STEAMBOAT VERSUS
THE WESTERN RIVERS

themselves to designing a boat which would overcome the obstacles in the rivers, or more often, simply adapt to them. The result of this tinkering was the rapid development of the western steamboat out of the eastern ship. At its highest development the steamboat was amazingly adept at navigating the unimproved waters of the Ohio and Mississippi Rivers, as well as nearly all of their tributaries. There was steamboat traffic on the Upper Minnesota River, the Des Moines and Cedar Rivers in Iowa, and on many streams like the Pecatonica in Illinois, which today is crossed by fences to keep cattle in. Rivermen told stories about legendary boats which could navigate on heavy dew or beer foam.

After the steamboatmen had brought the steamboat to its full potential, the only area for further improvement lay with the rivers themselves. At this point the Government, using the Corps of Engineers and the Topographical Bureau as its working arms, entered the scene. Beginning with isolated projects in the early 19th century, the Corps of Engineers gradually developed the inland waterways into a modern navigation system that is more in use today than ever before.

The development of the steamboat and the work of the Corps of Engineers in river improvement are inter-related. From the beginning of Corps surveys and experiments on the Mississippi and Ohio Rivers in 1819 down to World War I, the improvements made by the Engineers were designed almost solely to accommodate those floating, self-propelled gingerbread palaces. To understand much of the work of Engineers on the Upper Mississippi from 1829 to 1929, it is first necessary to understand the steamboat.

Robert Fulton's pioneer steamboat *Clermont* made its first successful trip in 1807. Within months, Fulton and his partner, Robert Livingston, had obtained an 18-year monopoly for their steamboat operation from Governor Claibourne of the Territory of New Orleans. Controlling the mouth of



SHREVE'S SNAG BOAT, PATENT No. 913, SEPTEMBER 12, 1835

- | | | |
|--|----------------------------------|---|
| AA': twin hull | G: main windlass chain | H: galley frame crossbeam |
| C: inclined bulkhead (iron-bridged) | LL: main engine shaft windlasses | UU: star engine shaft windlasses |
| D: snag beam (iron-bridged) | M: engine coupling shaft | XX: double main engine |
| FF: rollers for removal of snag timber | N: main windlass chain | Z: inclined plane for disposal of snag timber |

Henry Shreve's snagboat designed for the Ohio and Lower Mississippi Rivers. A succession of Shreve snagboats, built under contract to the Corps of Engineers, effectively cleared these rivers of sunken trees, one of the major obstacles to early navigation.

the Mississippi, of course, meant effectively controlling steam traffic on both the Mississippi and the Ohio—even before there were any steamboats to put there.

Fulton's and Livingston's interest in these western rivers had existed prim to the success of the *Clermont*. In developing his boat, Fulton had the West in mind from the very beginning. The extensive system of waterways tying the East to the Louisiana Purchase via Pittsburgh and Louisville seemed to be the only hope of bringing commerce, civilization, and cities to that rich but roadless territory.

River traffic on the Mississippi had already developed in response to those needs, but only by crude and slow rafts, flatboats, and keelboats. The rafts and flatboats were tacked-together floating woodpiles that were broken up once they had brought their supplies of fur or lead down to New Orleans. The keelboats went upriver again for more than one trip, and they went the hard way, pushed against the current by rows of men with long poles,

or pulled along the shore by ropes tied to upstream trees as they went. A keelboat could make the trip from New Orleans to the lead mines at Galena, Illinois, in one month. All of these boats were subject to the whims of the river and to uncertain crews of roustabouts.

This man-powered river traffic was never extensive. Prior to 1817 the whole commerce of New Orleans from the Upper Mississippi was about 20 flatboats of 100 tons each per year.¹

Two years after the maiden voyage of the *Clermont*, Fulton sent a representative, Nicholas Roosevelt, to Pittsburgh with instructions to make a survey of the Ohio and Lower Mississippi Rivers. In 1809 Roosevelt and his wife floated down the Ohio in a flatboat observing, asking questions, making soundings, and even lining up coal mines for possible future use as fuel stops. Between Natchez and New Orleans the Roosevelts went by rowboat to better observe currents and sandbars. They arrived in New Orleans on December 1.

Rivermen laughed at the idea of a steamboat on these rivers filled with strong currents and shoal waters, but Roosevelt convinced the Fulton-Livingston group that it could be done. In the spring of 1811, with plans supplied by Fulton, Roosevelt set about constructing a wooden steamboat at Pittsburgh. This boat was the *New Orleans*, 148.5 feet long with a 32.5-foot beam and a 12-foot draft. Whether it was a sternwheel or sidewheel boat is uncertain. Contemporary accounts support both views. The *New Orleans* was a plain boat with a single deck, one cabin divided into two compartments, and a pilot house.

When the *New Orleans* reached Louisville on the night of October 1, 1811, rivermen had to admit that she worked—but, they said, she would never return against the current. Roosevelt planned a big dinner for his Louisville hosts. While they were eating, the engines began and before the guests could catch their surprise, they found themselves out in the channel going upstream.

From Louisville the *New Orleans* successfully managed the Falls of the Ohio (the water was high) and steamed toward New Orleans, only to be caught in the middle of the famous "night of horrors," the New Madrid Earthquake of 1811, the greatest earthquake ever to strike North America. Huge waves churned from shore to shore, the water of the Mississippi turned bright red, dense flocks of birds darkened the sky, and familiar landmarks disappeared as the river changed its course in numerous places. The *New Orleans* held her own and the next day, with the earthquake continuing, steamed on to New Orleans, reaching there on January 12, 1812.

Perhaps the earthquake **was a fitting portent for** the arrival of this first steamboat on the Mississippi, **for** within 20 years the steamboat completely changed the pattern of commerce on the river, **and** made possible settlement along the Mississippi Valley long before roads and **railroads** came to do the **job**.

The New Orleans was **put into** service in the New Orleans-to-Natchez trade. In 1814 she hit a **stump** near **Baton Rouge** and **sank**,

At this point a **man** arrived who was to become a legend both for his contributions to **the** steamboat business and for his pioneer **work** for the Corps of Engineers. Henry Shreve had become captain of his own flatboat at the **age** of 21. In 1810 he travelled to the **lead** mines at **Galena**, from which he took 70 tons of lead aboard **keelboats** down to New Orleans, where he cleared a profit of \$11,000.

Shreve had examined **the New Orleans** and the second "Lon-Livingston boat," the *Vesuvius*. **As** a riverman acquainted with **western rivers**, he **knew** that these bulky **boats** were **not** the answers to easy transportation on the Mississippi.

The **problem** with these early steamboats was that **they** were designed in imitation of deep-water **seagoing ships**. They had rounded **hulls** with deep holds in **which** to carry the boilers. Like their **mean-**
going sisters, they had keels, **which** further in-

creased the draft without performing any real service for river navigation. And among other useless trappings, the *New Orleans* had portholes, a prow, and a long bowsprit. Other early steamboats retained masts. Finally, the engines of these early boats were not really powerful enough for the Mississippi current.

In 1814 Shreve became captain of the *Enterprise*, a boat built by Daniel French. With this boat Shreve intended to test another thing he found wrong with Fulton and Livingston: their monopoly on the Mississippi. In defiance of the monopoly, he arrived at New Orleans with the *Enterprise*, which was seized by court order. But at that moment New Orleans was under siege by the British, and General Andrew Jackson put Shreve into service transporting troops and material for the war effort. At the Battle of New Orleans, Shreve had charge of one of the field pieces that helped defeat a British column.²

Following the Battle of New Orleans, Shreve returned to the East determined to construct a boat, not according to preconceived notions of what a boat should be, but rather, a boat which took into account the nature of the river on which it was to be used. He also determined to use this boat to make a second attempt to break the Fulton-Livingston monopoly.

For several months Shreve isolated himself in a Brownsville, Pennsylvania, machine shop. He emerged with a radically new steam engine. It was horizontal rather than vertical; it had no flywheel and no condenser. It weighed a fraction of previous steam engines, yet it developed 100 horsepower. Finally, it was a high pressure engine where all previous steam engines had been low pressure.

Shreve had other surprises in store when it came time to install the engine in a boat. When a flattened hull, modeled along keelboat and flatboat lines, rose on the ways, critics asked how the machinery was going to fit. Shreve's answer was to put the boiler and engines on the deck rather than down in the hold. This left little room on the deck for freight or

passengers so Shreve **added** a second deck **on top of the first one**. He **also** divided the passenger cabin on **this deck into separate rooms for the first time**. He called these "**staterooms**" in imitation of the practice used on ocean-going **ships**, but he **was the first** to begin the practice of actually naming them after **states**.

Shreve's boat, the *Washington*, **400 tons**, survived the laughter of critics and a disastrous boiler explosion on its maiden **voyage** in 1816 to break the **steamboat** monopoly and open the **way** for new **ideas** in steamboat design. Within a **few years**, the **steamboat** had reduced transportation charges to **about** $\frac{1}{3}$ of their former keelboat and flatboat level.

Henry Shreve went on to **spend** most of his life in river improvement **work**. He **was appointed Superintendent of River Improvement** in 1827. In 1829, at the request of the Government, **he designed and built the first snagboat** for the removal of **sunken logs**. **Such sunken** trees, often **stuck** firmly in the river **bed** or still rooted there, were the **primary obstacle** to safe navigation on the Lower Mississippi. Shreve designed a sturdy, twin-hulled boat with **machinery suspended** between **the hulls to winch out** and cut up the snags. **This** boat, the *Heliopolis*, **invited** the same scorn and laughter from **river men** as his other **inventions** had, but it **soon showed** itself **capable** of handling both the snags and the laughter.

By 1838 Shreve had designed and built **five more** snagboats, adding **innovations** with each one. One of **these**, the *Eradicator*, was a light-draft, **single-hull boat** for use on the shallower **Upper Mississippi** where the huge double-hull boats could not go. After having developed and **used** snagboats **over** a period of ten years, Shreve, in 1838, obtained a **patent on** **&** fifth boat, the *Archimedes*. This action **caused a falling out** with Major Stephen H. Long when he **became Superintendent of Western River Improvements** in 1843. Long felt that Shreve had **no right to such patents**, since the twin-hull boat had been **suggested** to the Engineer Department **as early as 1824**, and since Shreve had designed and built all of his **boats** under Government contract

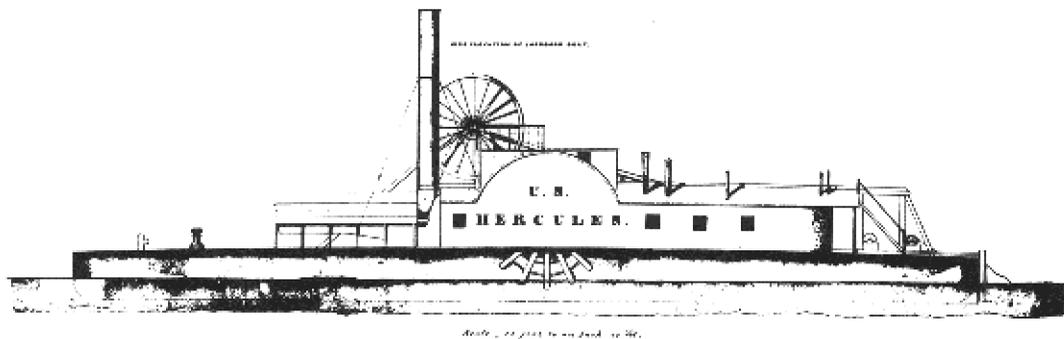
and at Government expense.³ Long did admit, however, that many of Shreve's innovations were important to the removing of navigation obstacles on the Lower Mississippi.

In addition to inventing, or at least perfecting, the snagboat, Henry Shreve went on to undertake the removal of the Red River Raft, a monumental log jam some 150 miles long which blocked navigation on the Red River. Shreve removed the raft in record time, as far upriver as Shreveport, the town which he founded,

Meanwhile, the steamboatmen went on adapting their craft to the demands of the river. One humorist described the later boats as "an engine on a raft with \$11,000 worth of jig-saw work."⁴ Compared to ocean ships they were flimsy, quickly-built vessels with an extremely high accident rate and short life span. But during the golden age of steamboating in the 1840's and 50's, they far surpassed their Eastern relatives in the furnishings and decorations of their passenger cabins, in which the packet companies went to great lengths to outdo each other.

For the most part, however, the innovations and additions which today make pictures of those old boats so romantic and nostalgic stemmed from practical concerns. The delicate gingerbread beauty of the steamboat was due to the dictates of the Western waters on which they floated. There was very little theory behind the designs, and few boats were built from careful plans. Most boats were built from the hull up in a sort of freehand, the builder free to experiment and innovate as the vision of the boat took shape in his head.

As steamboat design advanced, the hull lost more and more depth and grew flat, to move on the water rather than in it. The superstructure grew higher and higher partly to give the pilot the ability to see ahead of the boat far enough to maneuver through bends and around bars in time, and partly to increase carrying capacity. Even the romantic paddle



Views of the United States snagboat *Hercules*, designed by Colonel Stephen H. Long in 1846. Twin-hulled snagboats such as this were too large for operations on the Upper Mississippi

wheel was a product of river necessities, the channel in many places being too shallow for propellers.

Fully developed, the steamboat had three decks: main, boiler, and hurricane. Above these decks rested a shorter, narrower cabin called the Texas "because it was annexed," and atop this was the pilot house. The tall handsome smoke stacks of the boats were designed to carry sparks high above the flammable wooden decks.

Another distinctive feature of the Mississippi steamboat was the guards, extensions of the main deck beyond the hull sides. At first these extensions served to protect the side wheels. They kept banks and snags away from the fragile paddles and served as braces for the wheel shafts. Quickly, however, builders took advantage of this extra space and soon the whole first deck was built way beyond the hull, giving the largest steamers their characteristic impression of floating just above the water surface with no visible hull.

The steamboat by 1850 was able to carry incredible amounts of cargo on an unbelievable shallow draft. The first boats such as the *Enterprise* could carry about half their weight in cargo. By the 1880's, a few boats on the Upper Mississippi were carrying twice their rated tonnage.

Many of them did this on mere inches of water. The shallow channel above St. Louis challenged builders to produce a mosquito fleet capable of going up tributaries that today are difficult for a canoe. In 1867, the year following the beginning of the Rock Island District, two boats were constructed for the Upper Mississippi trade which drew 16 and 18 inches of water, though they displaced 220 and 280 tons, respectively.

If these boats were flimsy and dangerous, their profits were more than enough to make it worthwhile. A boat might cost its owner \$50,000, but it could pay for itself in two trips up and down the river. In the 19th century, the average life of a seagoing vessel was 20 years; that of a whaling ship was 40 years; but down to 1850, when the Government began to inspect and license boats, the average life of a steamboat was less than five years. At the beginning of 1849, only 22 of the 572 steamboats operating on Western waters were more than 5 years old.⁵

While the steamboat trade developed rapidly on the Lower Mississippi and the Ohio as far up as Louisville, the beginnings of steamboat traffic to St. Louis and further north took several years longer. Here the Mississippi was shallower, the current swift, and the sandbars more frequent. Rivermen assumed that no steamboat could ever navigate the rapids at Keokuk and Rock Island. In addition, the Upper Mississippi Valley was only sparsely settled until the 1840's.

Not until 1817 did a steamboat make its appearance on the Mississippi above the mouth of the Ohio. In August of that year the *Zebulon M. Pike* steamed up to the foot of Market Street in St. Louis. The *Pike* was the second-smallest steamboat documented on the Mississippi, a small craft of 31 tons.⁶ It had one smoke stack and was so underpowered that it required supplemental poling in strong currents.

Two years later, in 1819, the *Western Engineer*, constructed and commanded by Major Stephen H.

Long, went up the Missouri River on an exploring expedition. When it returned to St. Louis in 1820, Long took the boat upriver to the foot, of the rapids at Keokuk.

The *Western Engineer* was not only the first steamboat north of St. Louis, it was also undoubtedly the strangest. It was a small hat, 75 feet long with a 13-foot beam, drawing 30 inches of water. Her bow was constructed to resemble a scaly serpent rising out of the water, appearing to carry the boat on its back. The smokestacks were so arranged that smoke and steam came out of the serpent's mouth. The churning stern wheel further heightened the effect of a sea serpent carrying men on its back. The *Western Engineer* awed several Indian villages, which perhaps was one of its purposes. Those not frightened by the river dragon could be impressed by the three brass cannon mounted on the roof of the cabin, or the portrait of a white man and an Indian shaking hands.⁷

Until 1823 rivermen continued to assume that steamboats would never pass the Des Moines Rapids at Keokuk. In that year, however, a boat named the *Virginia*, 120 feet long, with a 22-foot beam and a 6-foot &ft—little larger than a keelboat—made the trip carrying a prototype steamboat cargo of military supplies, tourists, businessmen, Indiana, and soldiers.

Fortunately for historical record, one of the tourists on the *Virginia* was Giacomo Beltrami, the Italian exile and explorer who was at the moment interested in discovering the source of the Mississippi. Beltrami kept careful notes of the whole trip. Also on board was Great Eagle, a Sauk Chief, and Major Lawrence Taliaferro, the Indian Agent from Fort Snelling.

The *Virginia* left St. Louis on May 2, 1823, Beltrami was mused by the fact that as soon as the boat left the dock, Great Eagle, who had come to St. Louis to confer with General Clark (of Lewis and Clark fame), removed his uniform and made the rest of the trip "in status quo of our first parents."

If the *Virginia* set a record for speed on the Upper Mississippi, it was only because she was the first boat then. On the 9th of May while the boat was taking on wood, Beltrami went for a walk in the woods. Returning to find the boat gone on without him, he walked upstream until he came around a bend and found her stuck in one of her frequent encounters with a sandbar. A bit further upstream Great Eagle got into an argument with the captain over which channel, to take. He grew angry and swam ashore, where some of his people had been following the boat's progress along the shore. The next day when the boat arrived at Fort Edwards at the foot of the Des Moines Rapids, Great Eagle was already there.

After running the rapids with difficulty and "great good luck," the *Virginia* continued upriver. Beltrami found this section of the river a place of incredible beauty. The river "reflected the dazzling rays of the sun like glass; smiling hills formed a delightful contrast with the immense prairies, which are like oceans."⁹

On May 10th¹⁰ the *Virginia* arrived at Fort Armstrong at the foot of the Rock Island Rapids on the lower tip of Rock Island. Her arrival caused excitement among the soldiers stationed there, who saluted the arrival with cannon. But on leaving the fort, the *Virginia* stuck fast on a rock in the upper rapids, and according to Beltrami, "had not Providence come to our aid and swelled the waters of the river for two days, the steam-boat would perhaps have remained nailed to the rock."¹¹

The *Virginia* reached Fort Snelling at the mouth of the Minnesota River before turning around and coming back. That same summer in June she made a second trip between St. Louis and the Falls of St. Anthony.

For the next 20 years steamboating on the Upper Mississippi developed slowly. Galena lead mines contributed some traffic. In 1827, 7,000,000 pounds of lead came down to St. Louis from Galena, but some of this was still carried by keelboats. Most

steamboats above St. Louis at this time were chartered by the Government to transport military supplies to the string of forts along the river, or were hired by the American Fur Company.

By 1840 the populations of Iowa and Illinois began to boom. Between 1840 and 1860 Iowa went from a population of 43,112 to 674,913, while Illinois went from 476,183 to 1,711,951. Industry increased, too. By 1855 Moline, Illinois, was well known as a center of farm manufacture. John Deere plows were **shipped** by steamboat to Dubuque, Burlington, Muscatine, and Keokuk, Iowa.

Increased population and industry brought increased steamboat service. Arrivals of steamers at **St. Louis from the Upper Mississippi went from 143 in 1841 to 663 in 1846.** By **1854,** the year the first railroad bridge across the Mississippi was begun at **Rock Island,** the **Rock Island levee saw as many as 175 arrivals per month,** with the **average** being 20 per week from March to **December.** In **1857 Davenport, Iowa,** had 1,587 steamboat arrivals, 960 of these **having Davenport as a terminus.**¹²

Even the tributaries of the Upper Mississippi River developed steamboat traffic before the Civil War. By 1853 five **steamboats** were operating **commercially** on the Minnesota River, going to **Mankato, Minnesota,** on **regular** schedules. Several **boats** were **built specifically for the Chippewa River trade.**¹³ **Somewhat less regular service developed on the Iowa, Maquoketa, Cedar, Des Moines, and Rock Rivers** by 1860. Between 1850 and 1860, **40 boats operated on the Des Moines River.** In 1858-59, two of these **maintained** a regular schedule **between Des Moines and Fort Dodge, Iowa.**

During this same period, the logging industry grew to its status as an **American legend.** The two **saw mills along the Mississippi in 1840** grew to nearly 100 by the end of the **Civil War.** Feeding these mills from the **forests of Minnesota and Wisconsin** were immense log rafts floated down river by a crew of 20 to **35 men, who worked, cooked,**

and slept on the rafts, Composed of small units 16 by 32 feet tied together, a large raft might end up to be 300 feet wide by 1,600 feet long, containing up to 10,000,000 board feet of lumber. These long rafts had to be snaked and twisted through the river's S-shaped channels, a skill on the part of the raftsmen that today seems incredible.

During the early 1860's lumbermen began experimenting with the use of steamboats to take the log and lumber rafts downriver. Before this, their use had been limited to Lake Pepin, a wide section of the Mississippi between Minnesota and Wisconsin, where boats were needed to push the raft through the still current. Soon, steamboats were being designed specifically for the lumber trade. The first of these raftboats was the *J.S. Van Sant*, built in Le Claire, Iowa, by the Van Sant family of boat builders.

For 50 years, rafting traffic rivaled steamboating between St. Louis and St. Paul. Engineers who came to improve the river after the Civil War had to worry about the requirements of the rafts as much as of the steamboats. Canals, for instance, might be good for steamboats, but they weren't suited to the long wide rafts,

One other important steamboat innovation took place before the Civil War: the use of barges pushed by the boats. Pushing one or two barges (but still referred to as a towboat), a steamer could add significantly to the tonnage hauled. By 1866, according to a contemporary riverman, Stephen Hanks, nearly every commercial steamboat used barges. "Many of these were being used for the bulk shipment of grain.

When Colonel Wilson and his assistants arrived on the Upper Mississippi in 1866, steamboats had become a regular and important part of the Valley economy. Nevertheless, steamboating was still slow, irregular, highly seasonal, and dangerous because of the two rapids, the shifting channel, and an unpredictable low water season.

These hardships were bearable before the railroads brought competition, but by 1866 improvement was needed. The boat builders had performed wonders in adapting their boats to the Mississippi. But the design had been carried to near-perfection. Further improvements would have to lie with the Mississippi itself.

At this point and for this reason, the Corps of Engineers arrived to begin a series of projects to improve navigation on the Upper Mississippi River.

Notes

Chapter 1

1. Isaac Lippincott, "A History of River Improvement," *Journal of Political Economy*, XXII (July 1914), p. 636.
2. Mildred Hartsough, *From Canoe to Steel Barge on the Upper Mississippi* (Minneapolis, Minnesota: University of Minnesota Press, 1934), p. 45.
3. Major Stephen H. Long to Colonel Abert, September 1, 1843, File 338, RG 77, NA.
4. Louis Hunter, *Steamboats on the Western Rivers* (Cambridge: Harvard University Press, 1949), p. 62.
5. *Ibid.*, p. 100.
6. William Petersen, *Steamboating on the Upper Mississippi* (Iowa City, Iowa: State Historical Society of Iowa, 1968), p. 78.
7. Richard G. Wood, *Stephen Harriman Long* (Glendale, California: Arthur H. Clark o., 1966), pp. 62-65.
8. J.C. Beltrami, *A Pilgrimage in Europe and America*, Vol. I (London: Hunt and Clark, 1828), p. 127.
9. *Ibid.*, p. 151.
10. Some sources put this date on May 25.
11. Beltrami, p. 169.
12. Hartsough, p. 84.
13. *Ibid.*, p. 99.
14. *Ibid.*, p. 116.

