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Pre-1890 handcar with cast iron wheel rims and wrought iron spokes. In the 1890s lighter weight wheels were developed.
While today the handcar is viewed as a novelty, in the 1880s it was the utility truck for section gangs. With railroad development in the 1840s came various hand-powered track utility devices to transport maintenance men across the railroad. A number of hand-powered rail device concepts were patented, but most were not commercially successful.

The common handcar design that we are familiar with today was based on a four wheel lever car designed by Samuel Romans in 1848 and built at the Philadelphia and Reading Railroad shops. The device consisted of two small rear wheels and two large front wheels that were connected to a lever. A standing operator pulled the lever to propel the machine. Others improved the design, and ten years later a car resembling a modern handcar had become common place on American railroads.

Early handcars were built by railroads in their own shops. Beginning in the 1880s, companies such as the Kalamazoo Railroad Velocipede Company, Sheffield Car Company, and Buda Railway Supply Company further refined the design, offering a complete line of hand-powered rail vehicles.

By 1900 handcar designs from the three big manufacturers were virtually indistinguishable from each other. These were utilitarian devices designed to hold up to rigors of daily abusive railroad work. Handcars had a typical lifespan of seven years or 15,000 miles. The lifespan could further be extended an additional equal period by replacing the deck, bearings, and gears.
While at the turn of the century new gasoline-powered railroad maintenance vehicles appeared in catalogs, the handcar dominated sales for the first few years of the new century. By mid-decade, the handcar was on its way out. In 1905 the Los Angeles Times published a newspaper article indicating the end was coming for the handcar as gasoline-powered motor cars were more efficient. At the time, handcars traversed about 6,000,000 miles annually. Over the next five years, a number of stories appeared in newspapers across the country that covered the demise of the handcar.

Union Pacific was one of the last railroads to switch to motorcars. In 1911 the railroad replaced their pump cars operating on branch lines in Western Nebraska with gasoline-powered cars. The savings were immediate and allowed for the lengthening of maintenance-of-way territories. Crews no longer preserved extra stamina towards the end of the shift for the long pump back to the section house.

While the handcar was almost entirely replaced by 1912, some cars were kept around for local maintenance duties. The Logansport Press reported in 1961 that two boys stole a handcar on the Wabash Railroad in Delphi, Indiana and “pumped” 15 miles to Clymers where they were caught by local police.

Handcars remained in supplier catalogs into the early 1950s. They were briefly offered for sale once again in 1976 because Fairmont Railway Motors received an order from a Bolivian Railroad requesting 40 human powered handcars. The company filled the order and also briefly offered them for sale in the United States for $1500 each.
While motorcars had almost entirely replaced human-powered cars, handcars could still be found in rail yards and short line railroads into the 1980s. While motorcars were essential for transporting men and equipment many miles, they required fuel and regular maintenance to ensure reliable operation. On the other hand, handcars were lightweight and carried a sufficient number of tools on their decks. They did not require fuel, and it wasn’t exhausting for the crews that maintained terminals and yards to propel the cars over a mile or two of track. For this reason handcars survived alongside their motor car replacements.

In July 1970 George Payne captured these two photographs in Cleveland, Ohio of a Fairbanks Morse Sheffield handcar on the Norfolk and Western Railway. The car is in operational condition and was assigned to yard service. Notice the chain locking the walking beam in place to prevent joy rides.
Your kit comes with 42 different parts. In addition, it also includes all the fasteners with the exception of the deck screws and side board screws. Spend some time and get to know your parts before embarking on the project. Some components such as the axle bearing boxes contain separate parts, but are preassembled for your convenience.
The following are keys used throughout the instructions and plans. Numbers in keys on these two pages are reference numbers that correspond to part numbers. Fasteners and mechanical parts are only referred to by reference numbers. For historical accuracy I have cast original part numbers into many of the parts. However, I will use the simplified reference numbers on these pages to help you identify your parts. For example, part 138 corresponds to reference number 5. Mechanical components use reference numbers from 1 to 42, whereas fasteners use reference numbers from 200 to 224.

⚠️ The triangle refers to parts that you will need to fabricate such as wood components.

🟢 The circle refers to parts that are included in the kit.
**STEP 5**
The spokes are fit together and nailed to a board to create the wheel. Ensure that the nails are placed such that they will not interfere with the router when routing the diameter. For this reason, I make the spoke pieces longer so the nailed areas are removed after routing. The hub back plate is then attached and the hub bore drilled. Finally, the hub is attached and bolted on.

**STEP 6**
With the router jig and plunge router, rout the diameter of the wheel using many light passes. The center should be made such that it can be rammed or pressed into the wheel rim (part 42).

See Appendix A for template and photos of the wheel routing jig.
The diagrams provided will be a guide for building the wooden handcar frame. **Due to the complexity and precision fit of parts, it is highly recommended that no part of the plans is changed or modified in any way, and that all dimensions are held as accurately as possible.** This will become very important when the metal parts are installed, as changes in the plans can result in the inability of components to fit and or operate effectively.

All joints on the handcar frame should be made such that no glue is necessary to keep them together. The optimal joint should go together with the hit of a mallet or by pulling together with clamps. Joints should not be so tight that there becomes a risk of splitting the wood.

**Dado joints**

The dado joint jig shown is efficient in making perfect dado joints quickly and easily with a plunge router. Furthermore, it can cut multiple beams at one time allowing for exact matching parts.

Clamp identical wood boards together and dado as one. This will ensure that all joints match.
3. Mounting the drive gear to the crank shaft

Slide the drive gear onto the crankshaft and fasten in place with the set-screw (part 40). This mounting system is unique to handcars as it arrests the large amount of torque that the crankshaft applies to the gear. Slide crankshaft bearing boxes (part 11) onto each end of the crankshaft.

You may need to grind the corners of the crankshaft so it sits flat in the crankshaft holder on the drive gear (part 40).
**Quantity: 5**

Make 4 beams with counterbores because center beam does not require them.

**Quantity: 4**

Make 2 with mortises and truss rod holes.

**Quantity: 2**
*Material: Cast Iron

*Clamp top and bottom halves together to bore hole
While their role in contemporary times is often that of comedy as depicted in Hollywood films, handcars once served a very important role as they carried men and tools millions of miles building railroads around the world. Many people have a vague understanding of what a handcar is and how it is ridden, but may not realize that handcars served an integral purpose in the transportation industry and the rail interconnections of the modern world. This text covers many aspects of handcar education including history and modern-day applications, but most importantly, it includes the complete construction process and plans for the Kalamazoo Number 1 Standard Handcar. With hundreds of photos, 3D CAD drawings, and part plans, this book covers manufacturing details about handcars, while going into great depth about building and assembling a Kalamazoo 2017 full-size handcar. Whether you are a history lover, handcar hobbyist, railroad enthusiast, or plan on building a handcar, there is plenty of content for you to enjoy.