Aluminum Chariot

Bill of Materials

Qty.	Material	Description
11 ft.	2″ 6061-T6 SCH. 40 aluminum pipe	Tongue
10 ft.	1-1/2″ 6061-T6 SCH. 40 aluminum pipe	Axle
10 ft.	1-1/2″x 3/4″x 1/8″ Structural rectangular tubing	Yolk & evener
20 ft.	1″ Structural square tubing	Single tree & braces
10 ft.	3/4″ Structural square tubing	Cage
1	4 x 8 Sheet of 29 gauge sheet aluminum	Cage
1	2 x 2 ft. Sheet of 3003 3/16″ thick aluminum	Gussets & misc.
8 in.	3/4″ 6061-T6 SCH. 40 aluminum pipe	Axle rec.
2	5/8″ Grade B bolts 9″ in length	Axles
2	3/8″x 4″ Carriage bolts	Tongue & evener pins
2	3/8″x 2-1/2″ Carriage bolts	Evener to single tree pins
5	5/16″x 1″ Machine bolts	Brace bolts
100	1/8″x 1/2″ Aluminum pop rivets	

Construction on the chariot began with the tongue. It was a piece of *2"* 6061-T6 schedule 40 aluminum pipe that was cut 11' long. A piece of 3/8" rod was bent in a U-shape to go on the end of the tongue that would hold the yoke on. Also on the tongue was a small piece of strap approximately 16" long, welded to the underside to accommodate the braces coming up from the wheels. Other than that, there had to be a small piece of strap on top of the tongue with a hole drilled through it and the tongue to accommodate the evener. As a matter of safety, there was an 1/8" cable run through the center of the pipe. At one end, it was connected to the 3/8" rod that held on the neck yoke. At the other end, there was a hole drilled in a strap which was welded to the axle assembly. The cable served as a safety measure in the event the tongue would break. This would keep the tongue from digging into the dirt. After the tongue was roughed out, the axle was constructed.

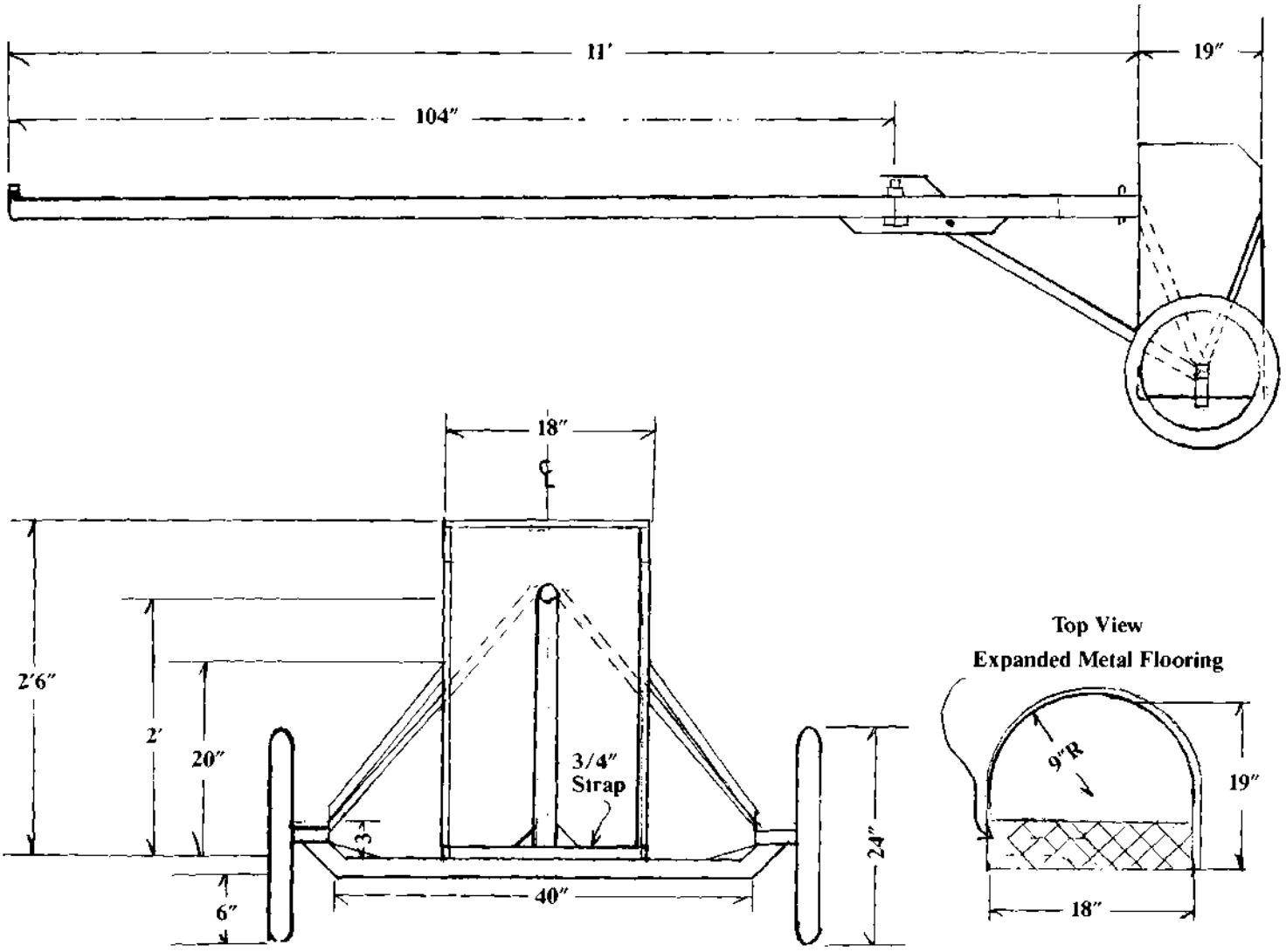
Three pieces of the 1-1/2" pipe were cut. One was 40" long with a 22-1/2° angle on one end and a 45° angle on the other end. The three pieces were puzzled together with the use of a straight edge to insure the angles were put together properly. After the angles were aligned, the axle assembly was welded

When the axle assembly was welded, a piece of 1-1/2" pipe was cut to approximately 26" long with a 51° angle on one end. The other end was saddled out to receive the axle assembly. A piece, approximately 12" long with a 51° angle on one end, was then welded onto the other angle to make the tongue receiver. Gussets were then welded on both 45° angles of the axle and both 90° angles where the tongue receiver met the axle.

The neck yoke is made of a piece of 1-1/2"x 3/4"x 1/8" structural tubing, cut to 44". Two pieces of 3/8" rod bent in a U-shape were then welded on both ends. Another piece of 3/8" rod was bent in a U-shape with 6" extending on either side of the U to spread the stress more evenly over the yoke. The yoke was then attached to the tongue with the piece of 3/8" rod that was bent into a U-shape, by welding it into the end of the tongue.

The evener was then cut out of a piece of the 1-1/2"x 3/4"x 1/8" structural tubing, 40" long. To this, four 3/16" spacers were added one at either end and two in the middle. Two small U-shaped straps were welded to the back of the evener. The washers were added as spacers for the single trees and as a rest for the evener on the tongue. The U-shaped straps are tie back brackets, which aid in keeping one horse from out-running the other by tying a small rope from this bracket back to a brace.

The axle receivers were constructed from a piece of 3003 3/16" plate cut 4"x 8". The plate was bent into a 90° angle. Two pieces of 3/4" pipe, 4" long, were set on one shelf of the angle and butted up against the other and welded in place. The pipe was capped on one end with a piece of 3003 plate aluminum. A 5/8" hole was drilled lengthwise through the 3/4" pipe on the drill press. This assembly will be the axle



receiver for the axle. The axle receivers were then set on top of the axle assembly. A 1/2" rod was run through both receivers, allowing a true and proper lineup. Measurements were taken from a pre-determined point directly underneath the tongue, back to both axle receivers, to get a square alignment on the wheels. The axle receivers were then welded into place.

The cage was constructed of 3/4" tubing bent into a U-shape and dropping down 2-1/2' at a 90° angle, by using two 45° angles. A piece of 1-1/2" strap was bent into the same U-shape as the 3/4" tubing, and placed at the bottom of the cage. A strap was also placed across the back of the cage. The cage frame was then welded to the axle assembly by saddling out the bottom 1-1/2" strap. 29-gauge sheet metal was then wrapped around the front of the cage and pop riveted into place. Tabs were welded along the bottom of the cage to receive a piece of expanded metal to serve as the floor in the chariot. Expanded metal was used to allow mud to fall through and to keep the floor from getting slick.

Braces of 1" square tubing were then placed from the axle assembly to the tongue, one on either side, and from the axle assembly to the back of the cage one on either side. The braces were bolted at the axle assembly and at the tongue. They were welded at the back of the cage. The wheels and eveners were then bolted onto the chariot.

At completion, the chariot had a total weight of 70 pounds. It took approximately 35 man hours to construct.