60 Foot Spray Rig

3ill of Materials

Length	Size	Description
12 ft	2 x 4 x 1/4	rectangular tube
29 ft	2 x 2 x 1/4	square tube
6 ft	4 x 5.4#	channel iron
4 sq ft	1/2"	plate
2 ft	1-1/2	round stock
5 ft	1/2 x 3	flat iron
2 ft	1-1/2	black pipe
4 ft	3/8 x 2-1/2	flat iron
2 ft	2 x 1 x 3/16	channel iron
13 sq ft	3/8	plate
48 ft	1 x .072	square tube
1 sq ft	1/4	plate
4 ft	3"	black pipe
1 ft	3 x 4.1#	channel iron

Frame Construction

The frame is constructed of 2"x 4"x 1 /4 rectangular tubing 12'2" long. The tubing was cut on a horizontal band saw. Two pieces of plate 9-l/2"x 21"x 1/2" were cut with a tracking oxygen and acetylene cutter. Two notches 2"x 4" were cut for the rectangular tubing. Two holes were drilled 2" up from bottom and *2"* from the front side, with a 1-1/8" drill bit. (Pins are 1".) Two pieces of steel plate were tacked 14-3/4" from center on both sides, to the rectangular tubing. The plate was squared to tubing with a steel framing square, then welded solid.

After tubing and plate was squared and welded solid, a 2"x 2"x 2.50 piece of square tubing was cut to 29-1/2" long. A mark was made 3-1 /2" in from the front of the plate and flush with the top of plate and the tubing was tacked into place. Measurements were checked and the parts welded solid. Two pieces of 3"x 1/2" flat by 6" long were rounded on the ends with a vertical band saw. All rough edges were ground with a stationary grinder. A center punch was used to mark a spot 1-1 /2" in from the side, and 4-1 /2" up from the bottom of the flat iron. A 1-1/8" hole was drilled at the mark. A spot was marked 1-1/2" from center on each side, and the flat iron was tacked in place, squared with the square tubing and welded solid.

Tank Mount

The tank mount was constructed of 32"x 4"x 5.4 standard channel iron. The channel was tacked to rectangular tubing, centered with 21 "x 9"x 1 /2" plate, squared with steel framing, and then welded solid. Two pieces of 2"x 2"x 1/8" angle, 31" long was squared and welded to the top of the channel iron. Two braces were cut 6-1/2"x 6-1/2"x 1/2" steel. The plate was cut in a triangular form. The plate was squared and welded to the back of the 9-1 /2"x 21 "x 1 /2" steel plate and to the top of the channel iron, for extra support.

Sheet metal was cut and formed around the tank and tacked to the angle iron to hold the tank into place when spraying or transporting sprayer. Two sheet metal straps were cut and formed around the top of the tank for extra support. The straps are bolted by 1 /4" bolts to the tank cradle.

The sprayer is designed for two separate tank placements. A tank can be placed on the sprayer or on the tractor.

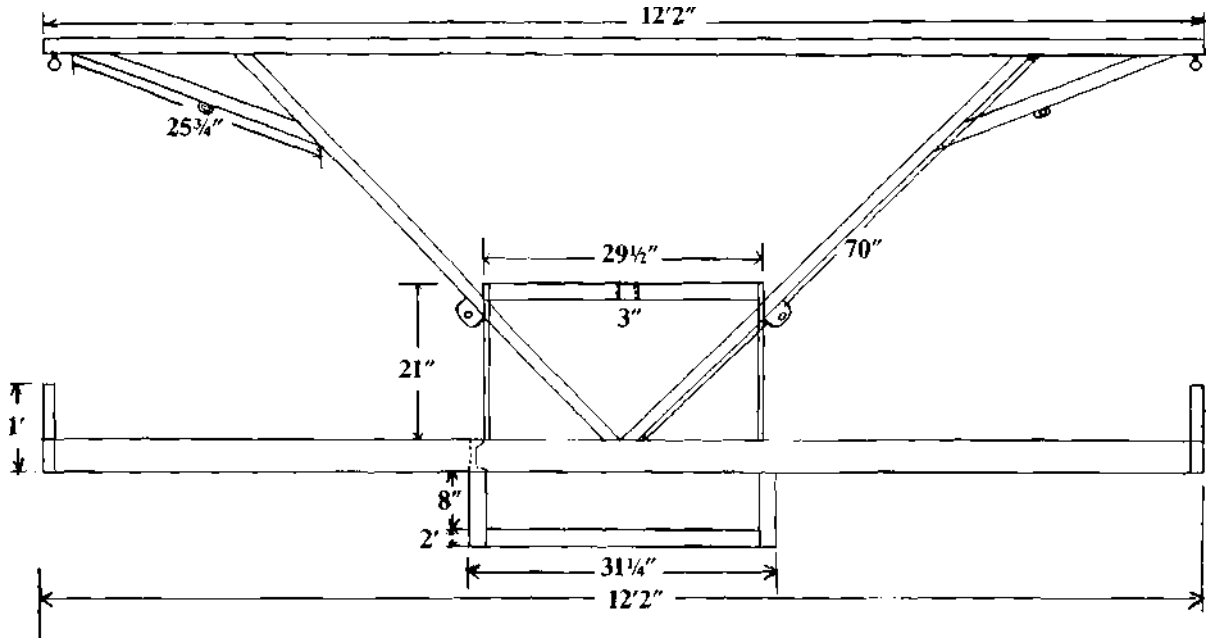
Boom Break-Away

Break-aways protect the boom and spray rig from getting bent. At the end of the frame on the sprayer are two pieces of 1-1 /2" round stock 1' long, welded to the end of tubing. For each break-away a 7"x 1-1/4" pipe was cut to fit over the round stock. A piece of 7"x 2" channel iron was centered and welded to the round pipe. Two pieces of flat iron 23"x 3-1 /2" were cut, along with 4 pieces 6"x 3-1 /2" flat iron. 49/64" holes were drilled in each end of the flat iron at 1-3/4" from the side and 2" from the end. The 6"x3-l/2 flat iron was squared and welded flush with the ends of the 23"x 3-1/2" flat iron. After this was done, this was squared and welded to the center of the channel iron.

Four pieces of 1 /2" flat iron were cut to 23"x 6". Two holes were drilled with a 49/64" drill at each end, at 3-1/2" in, from the end and 3" in, from the side of each piece. Four pieces of flat iron were cut to 6"x 3-1 /2". On one side of each piece, a 45° angle was cut so that when the boom is lifted it will not hit the 23"x 3-1 /2" flat iron. The 6"x 3-1 */I"* flat iron was squared and welded to the top, and flush with the ends of the 23"x 6" flat iron. When this was finished the flat iron with the 45° angle was faced toward the 23"x 3-1/2" flat iron, then 3/4" bolts were put through the bolt holes.

Note: all flat iron was cut with a tracking oxygen and acetylene cutter.

2' pieces of 3" steel pipe were cut with a band saw. 2-1 /2" holes were drilled 2" from center. Notches were made in 2 of the holes of the 23"x 6" flat iron on opposite sides, so that when the break-away comes back together it won't catch on the bolt. The pipe was centered to flat iron, tacked, then checked for center again, and welded solid. On the back center of the 23"x 6" flat iron, a chain link was welded. Two pieces of 6"x 3"x 4.1 # channel iron were cut with a horizontal band saw along with 2 pieces of flat iron 6"x 3"x 1/4". A 1/2 hole was drilled 1-3/4"



in from the side and *2"* down from the top of the channel iron. The flat iron is squared and welded to the end of the channel iron, so the flat iron won't interfere with the aluminum pipe sliding in the steel pipe. The channel iron was layed on the bottom side of the steel pipe, centered with the flat iron on the other end of the steel pipe. The 2 pieces of 23"x 3-1 /2"x 1 / 2" needed 2 braces on the back for extra support, the braces are 6"x 2-1 /2"x 3/8". They are centered and welded to the 23"x 3-1/2"x 1/2" and also centered to the 1-1/2" round pipe.

An eye bolt is inserted into the hole of the 6"x 3"x 1/4" flat iron. A spring is hooked to the chain link, then hooked to the eye bolt where the spring can be tightened. The spring is used to hold the booms from moving, when spraying. If the sprayer was to hit something solid, the booms would break-away, preventing damage to the booms or other parts of the sprayer. When the tractor backs up to avoid an object, the spring will pull the sprayer boom back into place.

Hydraulics

The sprayer is designed to operate on hydraulics. Four pieces of 4-l/2"x3"x l/4"andtwopiecesof6-l/2"x3"x 1/4" flat iron were cut. The two pieces of 6-1/2"x 3"x 1/4" flat iron was welded 1" from the 1-1/2" steel pipe. On the back side of the break-away the ram attachment is squared and welded. About 30" away, another ram attachment is welded to the rectangular pipe of the main frame. This ram is used to move the boom up close to the tractor and back out to the side of the sprayer. Then two other ram attachments are squared and welded to the boom braces, down flush against the 21 "x 9-1/2"x 1/2" steel plate. The ram is attached to the ram attachment, on one end of the two hydraulic rams that run along the boom braces. The cable runs through a pulley then hooks to a chain link about 41" away from the hydraulic attachment. These hydraulic rams raise and lower the booms.

Booms

The booms are constructed of two pieces of 24' aluminum pipe with a wall thickness of 1.88", the aluminum pipe has outside diameter of 3". The pipe of the break-away into which the aluminum pipe is inserted has an inside diameter measurement of 3.046". The aluminum pipe and the break-away pipe fit snug inside to reduce movement. The aluminum pipe is held in the break-away pipe by 2-3/4" bolts. The break-away pipe is centered and measured 1" out from each side of center. The hole was drilled with a 1 /2" drill bit.

The booms have a l"x 1" square tubing, that runs along the aluminum pipe, and along the bottom of the tank carry, which runs 3-1 */2"* away from the rectangular pipe of the main frame. The square tubing is 3-1/2" from the aluminum pipe on the back side. The square tubing attaches to the aluminum by clamps welded to the square tubing. Ten sets of clamps, five sets per boom, were used. The clamps are held to the aluminum pipe by 2-9/16" bolts per clamp. The clamps are 52-1 /2" apart.

The l"x 1" square tubing is used to carry to sprayer hoses.

The booms are braced by cables that run from a brace welded to the main frame. The cable holds the booms in four places. The cable runs from the brace that is mounted on the main frame. A 2"x 2" notch was cut out of the tops of the 21 "x 9-1/2"x 1/2" steel plate. Two pieces of 2"x 2"x 1/4" square tubing 70" long had the ends cut at a 45 degree angle. One piece of 2"x 2"x 1 /4" square tubing 12'2" long was cut with a 14" abrasive wheel cutter. The 70" pieces run from the center of the rectangular tubing of the main frame and out through the notches of the plate. The tubing was tacked to the rectangular tubing and to the plate. The 12'2" tubing was placed on the tops of the 70" tubing. When everything was squared, it was welded solid. The ends of two pieces of 2"x 2"x 1/4" square tubing 25-3/4" long were cut at angles with the vertical band saw to fit the angles running from the 70" tubing to the 12'2" tubing, held in place by C clamps, then welded solid.

A permanent stand on the sprayer lifts the sprayer off the ground, to make it easier to hook the tractor up to the sprayer. The stand is made up of 2" square tubing. Four legs 10" long are squared and welded to the bottom of the tank. The legs are 27-3/4" away from each other, two 29-1 /4" pieces are welded to the bottom of the legs.