

# Large Round Hay Bale Carrier-Unroller

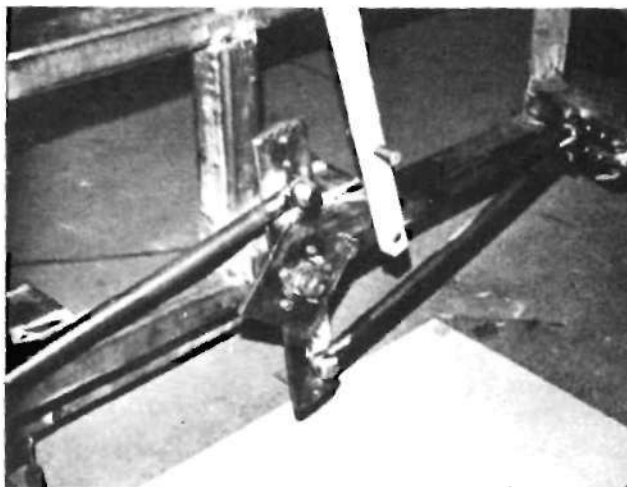
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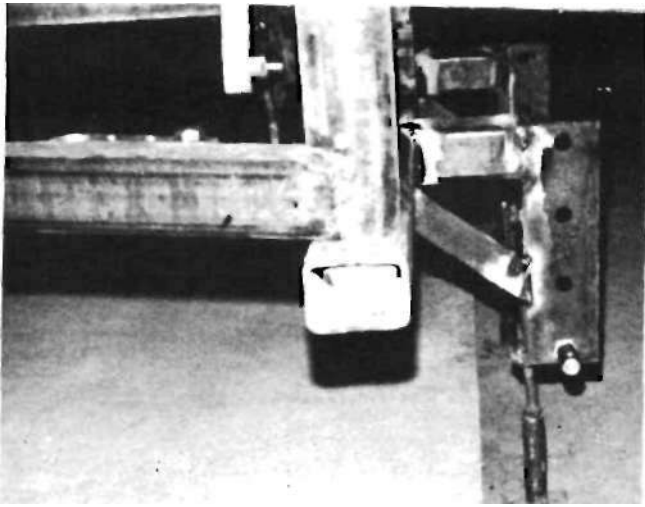
## Lift Arm and Bale Center Construction:

The lift arms were made by welding two automotive spindles to two 6" supports of rectangular tubing. The hubs were removed from the spindles to keep from burning the grease seals within each hub. Secondly, the two spindles and supports were welded with vee butt and fillet welds to the two rectangular tubing lift arms to form the left and right lift arms. Each lift arm was then fitted to the two pipes which compose the outer components of the arm hinges and welded with fillet and flush vee butt welds. Thirdly, a lift arm brace of flat strap was cut, bent, and fillet welded to each lift arm and outer hinge pipe. In the fourth step, the lift arm tie rod mounts were cut from fiat strap and the tie rod adjustment holes were drilled. The lift arm tie rod mounts were then fillet welded to the lift arms, keeping in mind that there are left and right arms. Following this, holes were drilled and threaded in the outer hinge pipes to accept two grease fittings in each of the two outer hinge pipes.

After the two lift arms were constructed, the two identical bale centers were made as depicted in drawing two. One end of each bale center pipe was sharply orange-peeled. The orange-peeled end of each bale center pipe was then bent together and welded to form a point. In the second step, two disks were cut from sheet metal for each bale face disk and welded together with a fillet weld. Next, a hole was cut in the center of each of the two bale face disks to allow the hub and bale center pipe to protrude through each disk. The holes of the five hub lugs were then drilled in each disk. To complete this segment of construction, the two center pipes were welded to the bale face disks with a fillet weld on the bale side of the disk and a flush circular vee butt weld on the hub side of the disk.

Construction of the main frame began by cutting the upper and lower frame supports from rectangular tubing. Holes were then cut in the ends to allow the interior pipes of the lift arm hinges to protrude through the two rectangular supports. Secondly, the two interior pipes of the lift arm hinges were cut and were welded to the lower rectangular frame support with circular fillet and flush vee butt welds. The third step in construction was to cut the four pipe wear washers. Two of these washers were placed over the interior lift arm hinge pipes and fillet welded to the lower rectangular frame support. The fourth step involved slipping the two lift arms over their respective interior hinge pipes and attaching the upper rectangular frame support with circular fillet and flush vee butt welds. Lastly, the two remaining pipe wear





washers were each cut in half perpendicular to their diameters. These half-washers were placed around the interior hinge pipes and between the upper rectangular frame support and the lift arm exterior hinge pipes to be welded to the frame support with fillet welds.

The next segment of the main frame construction was to attach an automotive spindle to a rectangular tubing support. The arm turnstyle was attached to this hub later in construction. Secondly, the spindle and support were welded to the lower rectangular frame support with fillet and vee butt welds. Thirdly, a length of rectangular tubing was fillet and vee butt welded to the upper frame and turnstyle supports. The upper hydraulic cylinder mounting was then constructed.

### Arm Turnstyle and Tie Rod Construction

Construction of the arm turnstyle began with cutting a hole in the center of an 8" square piece of  $V_i$ " thick metal plate to allow the automotive hub to protrude through the center of the arm turnstyle. The second step involved locating and drilling the five hub lug holes. This was followed by cutting two lengths of flat strap metal and welding them to the center piece of turnstyle using vee butt welds.

Two lengths of extra heavy inch pipe were cut to serve as tie rods. The ends of the pipes were flattened to make sure that each flattened pipe end was perpendicular to its opposite end. Secondly, a category I top-link ball and socket was welded to each end of each pipe with the ball and socket on one end of the pipe on a horizontal axis while the ball and socket on the opposite end of the pipe was on a vertical axis. The balls and sockets were welded to the pipes with fillet welds using nickel welding electrodes.

### Three Point Hitch Hookup Construction

Construction of the three-point hitch hookup began by cutting two lengths of angle iron to serve as the two lower three-point linkage attachments. Four adjustment holes were drilled in one leg of each angle iron to accept the three-point pull pins. Each angle iron was

welded at right angles to a 6" length of rectangular tubing. Two support braces were welded between the lower hitch attachments and the main frame lower rectangular support. The lower hitch attachment was completed after cutting and welding a length of  $1/4$ " thick flat strap metal to serve as a lower hitch attachment stiffener.

To make the hitch mast two lengths of  $V_i$ " thick flat strap metal was cut and drilled with 8 top-link adjustment holes. Two 6" lengths of rectangular tubing were used as mast extensions. Lengths of  $W$  thick flat strap metal were cut and welded just inside the ends of each piece of rectangular tubing. This added strength to the machine and approved the appearance.

### Materials length

Rectangular tubing:

4" x 3" x  $1/4$ " 28' 6"

Flats

$W$ x $2W$  2' 5' $1/2$ "

$1/2$ "x3" 1L' 2 $3/4$ "

$V_i$ " x2" 4' 10' $1/4$ "

$V_i$ " x 4" 4' 2' $1/2$ "

$V_i$ " x 8" 8"

1" x 8" 3' $1/2$ "

Angle

4" x 4" x  $V_i$ " 2' 4"

Standard black pipe

3" 2' 1P' $1/2$ "

2 $V_2$ " }'

Extra strong black pipe

2 $V_i$ " 4'

1" 5' 2"

Sheet metal

1 -  $1/4$ " x 1' 6" x 4"

Hardware

3 - five bolt automotive hubs with spindles, lugs and nuts

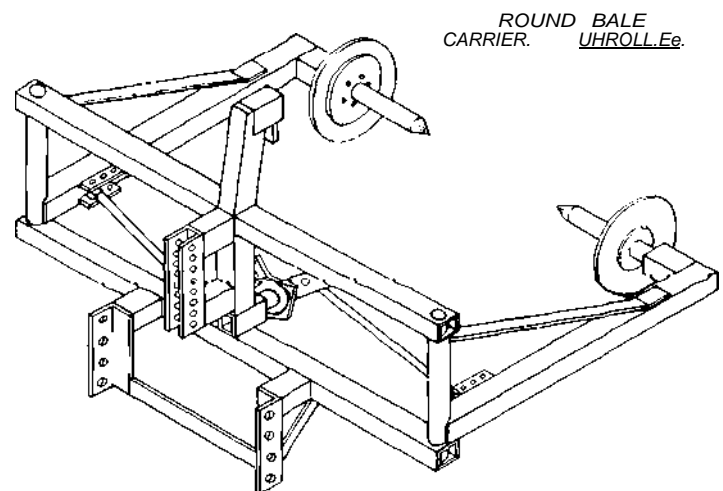
2 -  $W$  x 3" bolts with lock washers and nuts

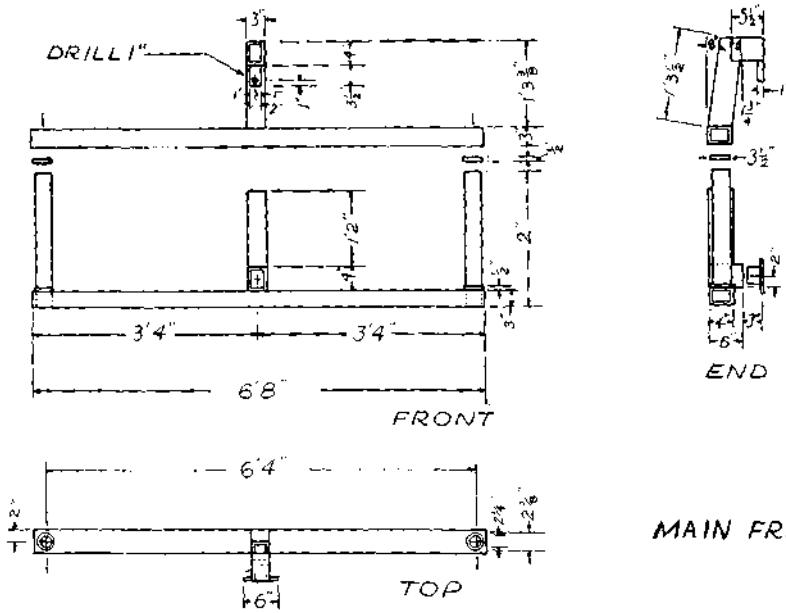
2 -  $W$  x 4" bolts with lock washers and nuts

2 - category II pull pins

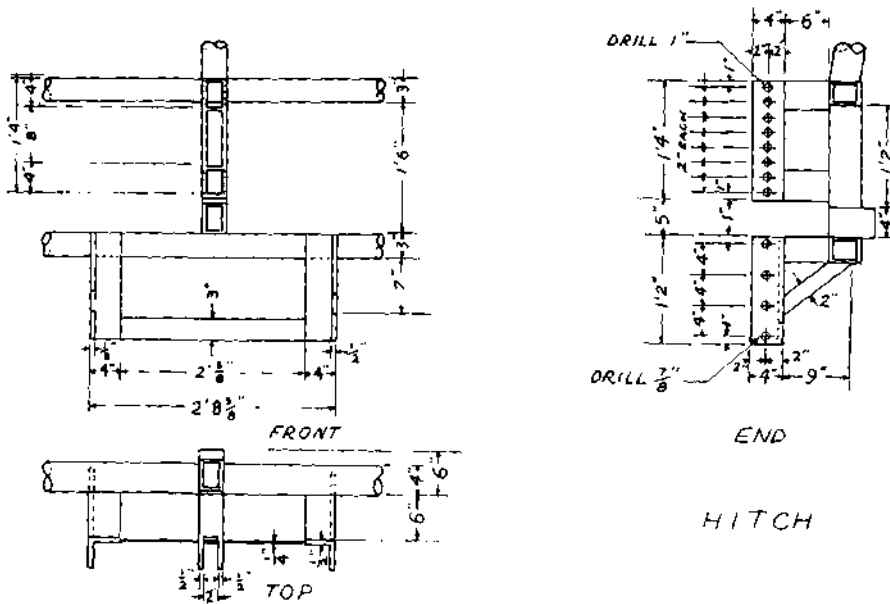
4 - category I top - link balls and sockets

4 - grease fittings

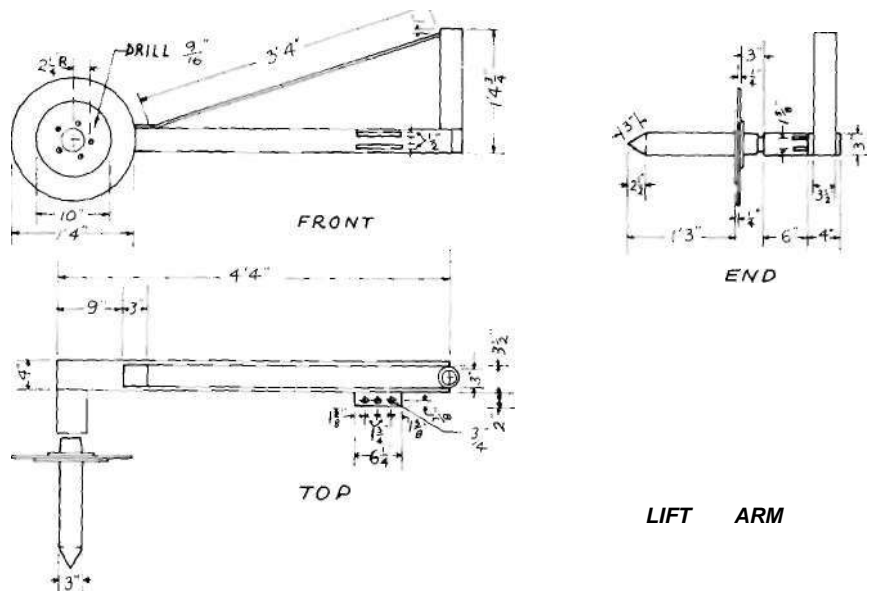




MAIN FRAME



HITCH



LIFT ARM