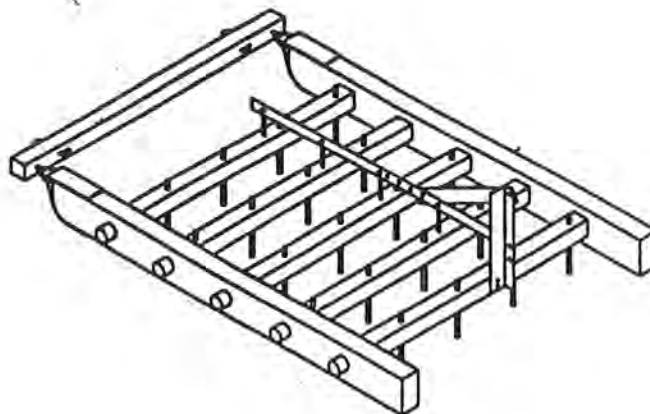


# Tillers' TechGuide



## Wood-Framed Spike-Tooth Harrow

by Richard Roosenberg

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A trainee at Tillers, Ross Ferguson, had worked in a ox farming project in Zambia. He had had problems with the harrow available there. Since he was planning to return after finishing his work at the University in San Louis Obispo, he was searching for alternatives. First, the available harrows required too power for the Zambian cattle. Further, the

harrows would clog with any organic matter left in the field. This encouraged farmers to burn off all the crop residue left from prior crops. Ross, of course, wanted a low-cost design which would minimize these problems.

We showed him the metal-framed spike-toothed harrows in the Abbey Collection which were so popular on American farms. Those had a hand lever by which the operator could quickly change the angle of the teeth. Angled back, the teeth do not penetrate the soil as much and the harrow bounces enough to continually clear the organic matter off the teeth. The ability to control the angle of the teeth permits adjustment of the draft to accommodate smaller animals.

### *Editor's Note*

*This initial TechGuide draft is the product of workshop efforts, drawing, and field feedback. In addition to Ross Ferguson's articulation of the need, Tom Traexler, Jim Sterns, and Ken Alexander helped execute the plan. A number of international people have since worked on it at TILLERS. We owe a special debt to Steve Ferguson for drafting the plans using a computer assisted design program, CAD. To facilitate this and subsequent TechGuides, Fabri-Kal Corporation gave Tillers a grant for the necessary computer hardware. Staff time for writing and mailing this draft was made possible by a grant from the Harold and Grace Upjohn Foundation.*

*Please send comments to:*

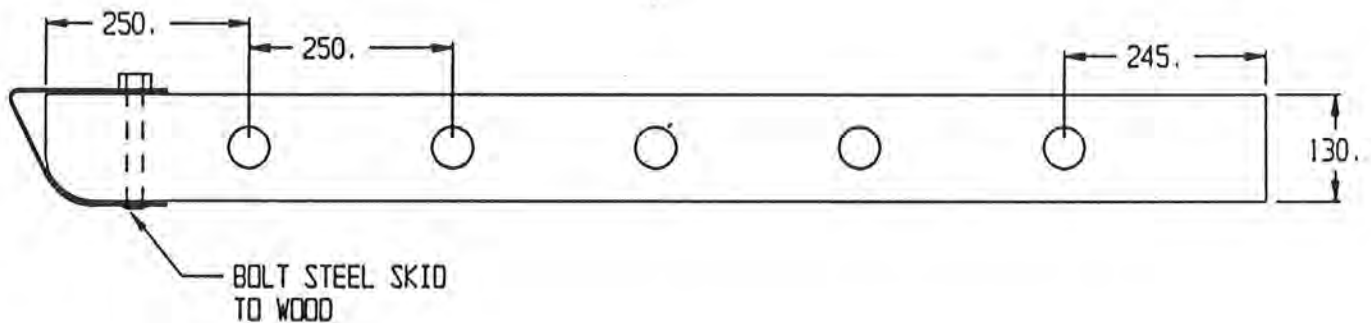
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## The Concept

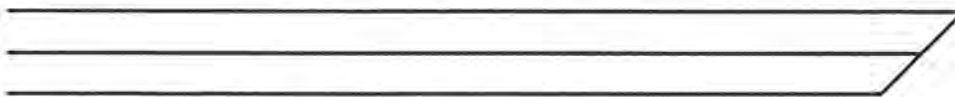
To keep the cost of the harrow within limits, Ross wanted to try building it from wood. We proposed using the same basic design as the adjustable metal spike tooth harrows, but to make it of wood. It would require no more wood than a rigid tyne model. Instead of using rectangular mortice and tenons to join the cross bars with the side skids, we decided to make those round to permit the cross bars to rotate within the side skids. Then the rotation of the cross bars would be controlled with a metal bar over the top which would tie them all together. Rather than having a complex lever mechanism for control, we opted for a simple triangle. The third point of the triangle could be changed by moving a pin to one of several holes in the metal bar.

## Components

We made the side skids from burr oak which we chose for its durability and water resistance. It was 130mm wide, 55mm thick, and nearly 1.5m long. We rounded the lower edge of its tip so it would climb over obstacles and then protected the tip with a strap of steel. The strap would be securely bolted so it could serve as the hitching point from which the harrow would be pulled. Then we used a 50mm auger for drilling the holes into which we would fit the ends of the cross bars. The size of hole can be adapted to fit the drill available and/or the desired size of the rounded ends of the cross bars. From concern that the wood of the cross bar would swell in field moisture and seize the desired rotation, we encased them inside metal tubing.



**FIGURE 2:** Harrow side.



**FIGURE 3:** Tooth Design, Side View

The rotating cross bar designs

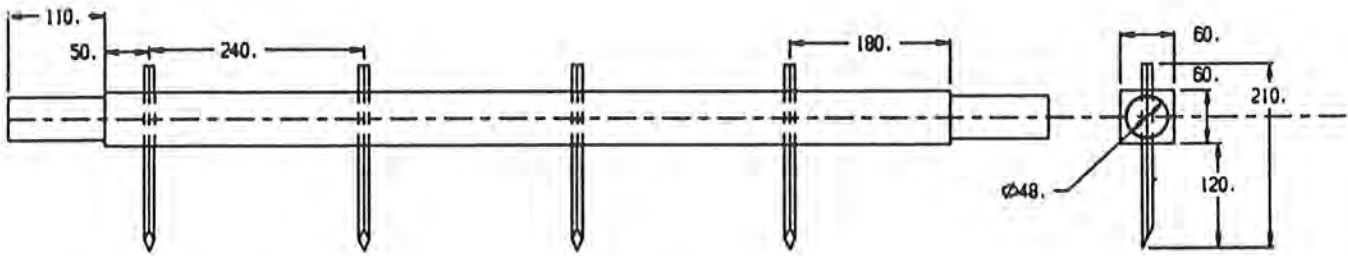


FIGURE 4: Design and dimensions of harrow cross members.

## TINE ANGLE CONTROL MECHANISM

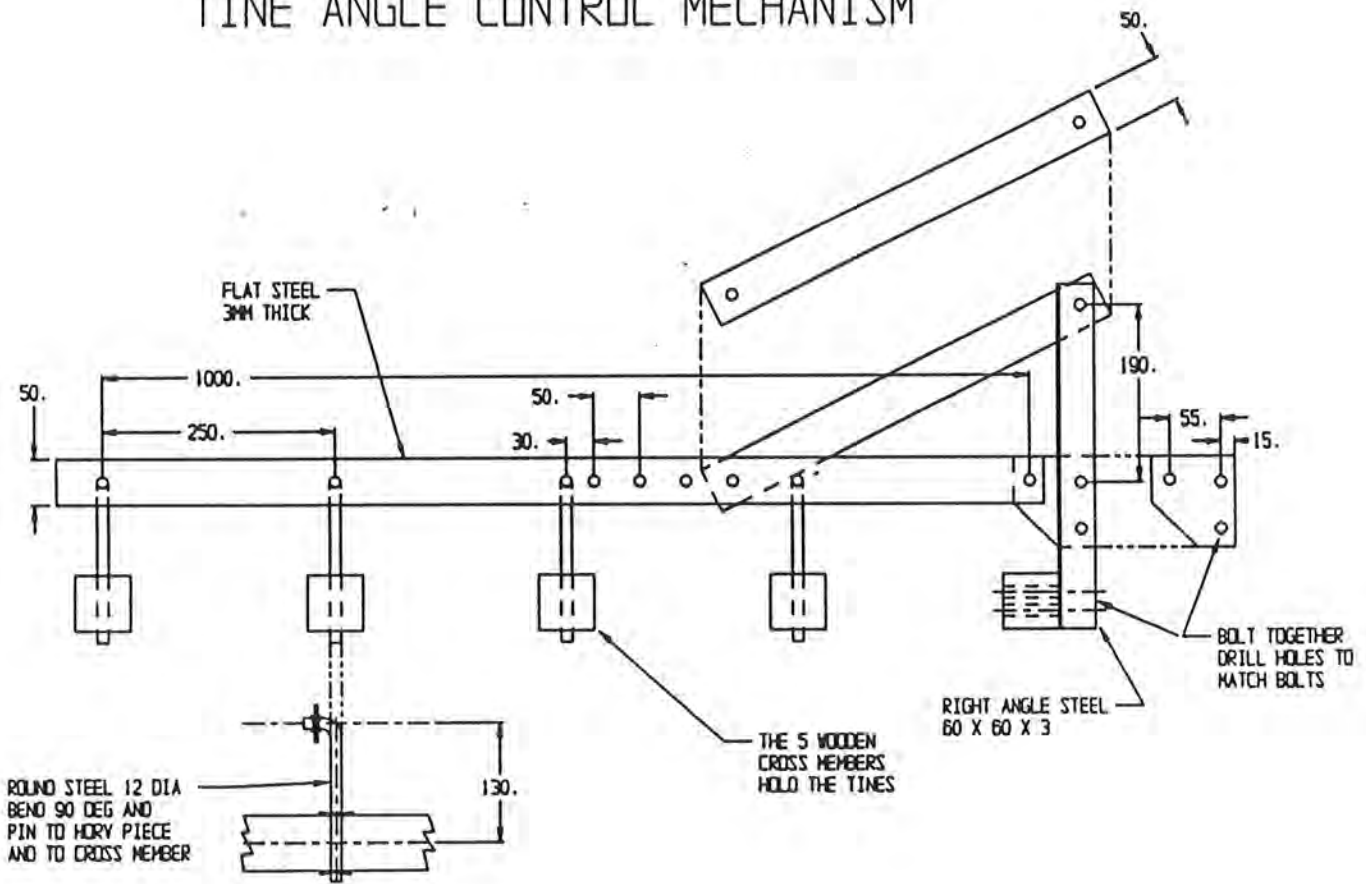
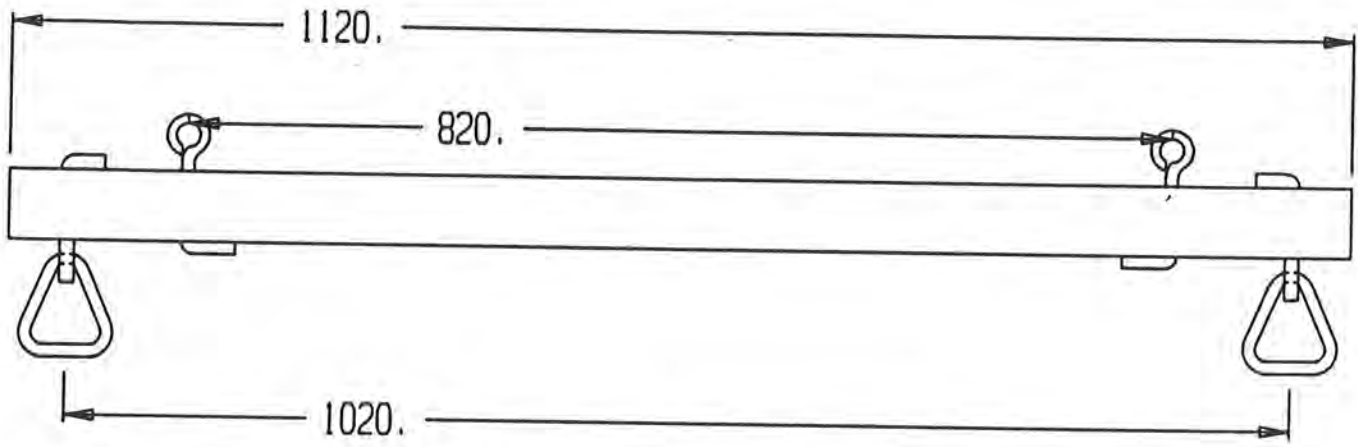


FIGURE 5: Draft adjustment mechanism.

tgharrow:draft1



**FIGURE 6:** *Spacer and hitchpoint construction.*

# TINE ANGLE CONTROL MECHANISM

