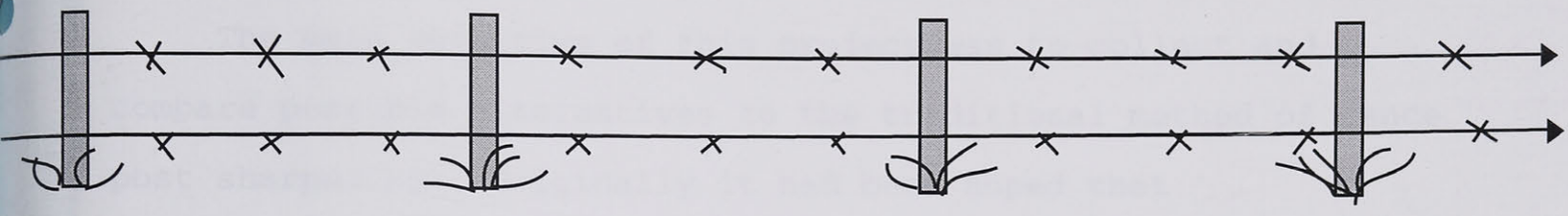

FENCE POST SHARPENER

- ROY TAYLOR

EXECUTIVE SUMMARY

The main objective of this project was to collect and compare possible alternatives to the traditional method of fence post sharpening. Originally it had been hoped that specifications for a prototype could have been arrived at, however, after an attempted literature review it was discovered that little work had ever been reported on this type of design. Therefore, while the paper does report on what is believed to be a very good design alternative, no final specifications are given. It is concluded that if a market for such a product exists that it will be necessary to do some further research and testing in order to arrive at a final~~ized~~ design.

The design which appears to hold the most promise combines the use of a circular saw and a horizontal holding table. The saw will be free to slide back and forth the width of the table and will be mounted on an incline in order to achieve the desired cut. In addition, the table will be constructed large enough to hold four posts at once which, it is hoped, will increase the output efficiency.

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INTRODUCTION

avoid personal pronouns

If ever one has travelled the rural areas of North America, he has no doubt been witness to, at least a few, of the thousands of fence post which dot the landscape. What the casual observer may not be aware of, is the fact that many of those fence posts have had one of their ends sharpened (the end out of sight in the ground) to facilitate the task of driving the post into the ground.

Today, one of the most common methods (and the only method this writer is familiar with) used to sharpen posts involves the use a chain saw. The saw is used to make four, perpendicular angled cuts which results in an effective point being formed at the end of the post. However, this method is rather labour intensive and potentially dangerous (as any operation with a chain saw is) and therefore it would be advantages to design a system which would improve the task of sharpening fence posts.

This paper will look at different alternatives which might possibly improve the task of post sharpening and, in addition, will make some recommendations about future steps that could be taken to further explore the possibilities.

OBJECTIVES

The project has several objectives, which include:

1. Automate the task of fence post sharpening
2. Discussion of different alternatives
3. Improve the efficiency (fence post per man-hour)
4. Improve the task safety
5. List recommendations for future studies

DESIGN METHODOLOGY

In approaching the problem of improving the post sharpening task, two distinct design areas were looked at. Namely those were; a) the cutting tool and b) the design set-up. The following discussion will be a walk through the different alternatives considered and the design criteria used to decide among those alternatives.

CUTTING TOOL

In order to sharpen a wooden post it will be necessary to have some sort of cutting tool. For this project there were four different cutting alternatives considered. Namely these were;
1. A chain similar to that used on a chain saw. The fact that chain saws are presently used to sharpen posts would seem to indicate that they are effective in doing the job. However, as they are presently used, they can pose real danger to the operator and therefore a design using a chain would really have to stress safety. Chains also have to be hand sharpened on a regular basis which decreases output. 2. Band saw - Band saws are commonly used tools particularly in wood working shops. Their main drawback for this application is the fact that they are prone to breaking. 3. Circular saw blade - Circular saws are used quite commonly in wood milling operations. They are strong and able to cut at relatively high speeds. 4. Rotating Knives - In contrast to the first three alternatives, which all work by cutting through the post, this alternative would work on the basis of shaving the wood into the desired shape. Several applications of this type of device can be

found in Mechanics Of Cutting Plant Material and are also very common in wood shredding operations.

To compare the four alternatives listed above, three design criteria were decided upon. These criteria were; a) Durability - This was a measure of the alternatives resistance to break down. b) Speed - Used to rank the speed at which the different alternatives were capable of performing the necessary cuts and c) Maintenance - An indication of the routine time required to keep the different alternatives functioning properly. An attempted literature review was unable to provide quantitative values for the criteria chosen and therefore the designer relied upon personal experience to complete the comparison. The results of the comparison can be found in table #1. The alternatives were compared using a numerical ranking system with a rank of 1 being poor and a rank of 3 being good. The final result is that the circular saw blade was chosen to be the best alternative for the cutting tool.

Table #1 Cutting Tool Alternatives Comparison Table

	Chain	Band Saw	Circular Blade	Rotating Knives
Durability	2	1	3	2
Speed	2	1	3	3
Maintenance	1	2	2	1
Total	5	4	8	6

DESIGN SET-UP

This part of the overall design dealt with arriving at a complete system that would meet the goals which were previously outlined in the objectives section. Three basic alternatives were arrived at to solve this problem. The first alternative (Figure #1) is one that was arrived at almost at once. This design is basically a large scale pencil sharpener, powered by a tractor PTO. While this seemed like a neat solution it did have several problems the largest being output capacity. In addition, the cutting device used with this alternative, was rotating knives which were already out weighted ranked by the circular saw. The second alternative (Figure #2) is highlighted by an inclined post table and a vertical cutting plane. The table would be used to hold the post in position while the blade was cutting. The third alternative (Figure #3) is characterised by a horizontal table top and inclined cutting plane.

To decide among these three alternatives a set of design criteria was once again chosen. This time, the criteria list included; a) Output - measured by the number of sharpened post per unit time. b) Safety - reflecting the degree of safety the operator running the system could expect. c) Cost - indicating the cost of building and running the set-up and d) Ease of operation - measuring the ease or, inversely, the complexity of using the design. The results of the comparison can be found in table #2. Just as in table #1 , a value of 1 represents a poor alternative while a rank value of 3 represents a good alternative. Once again there was no published data (or at least none that this writer could find) that could help in the comparison of alternatives. Therefore, it was

thoughts are better

necessary to use personal feelings and experience while comparing the alternatives. Obviously this is not an ideal situation, especially when one considers the lack of designing experience this writer has, but more will be mentioned about this point in the recommendations section.

As indicated in table #2, alternative #3 (i.e. the inclined cutting plane) was chosen as the best set-up for the design.

Table #2 Set-up Alternatives Comparison Table

	"Pencil Sharpener"	Vertical Cutting Plane	Inclined Cutting Plane
Output	2	1	3
Safety	1	3	2
Cost	2	2	2
Ease of Op.	2	1	3
Total	7	7	10

At this point in the design procedure, a combination of the circular saw blade and horizontal post table has been chosen as the best deign set-up. The circular saw will be supported by two circular rails located at the front of the table. The table will be made wide enough so as to support four posts at a time thereby resulting in four cuts each time the saw travels the width of the table. This feature was added in an attempt to increase the output. Figure #4 illustrates, by way of rough sketch, how the set-up will look.

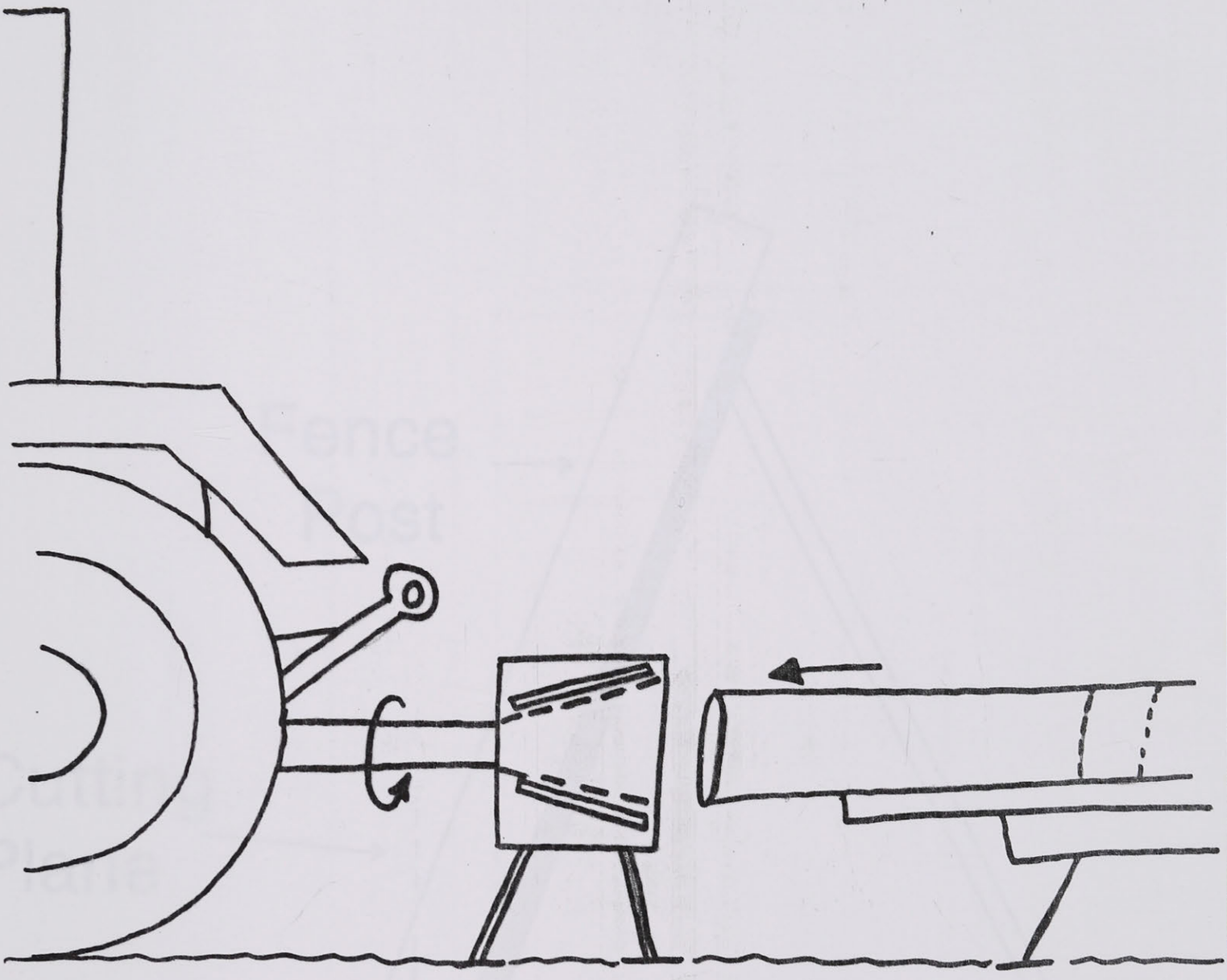

Figure #1 Set-up Alternative #1

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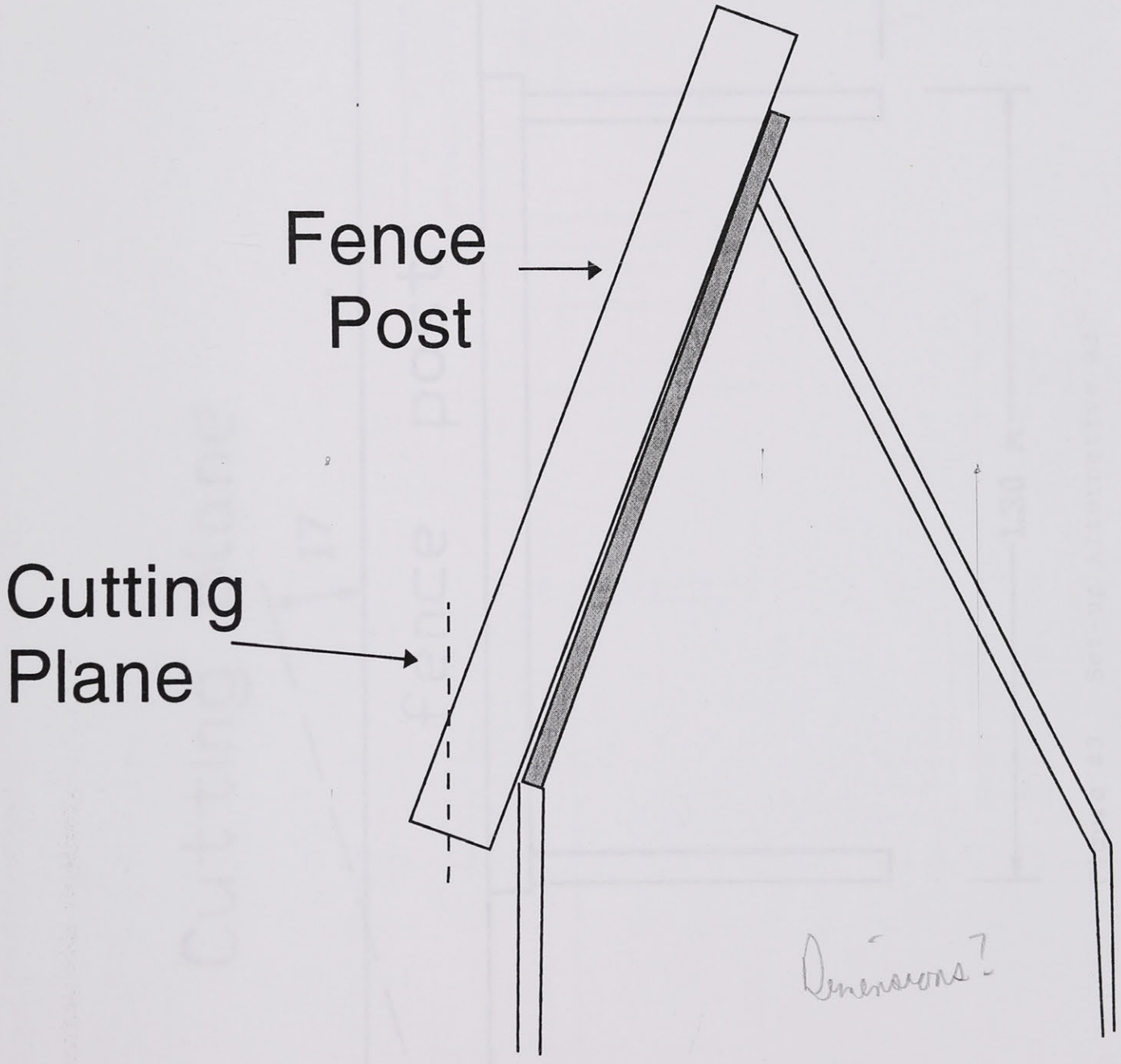


Figure #2 Set-up Alternative #2

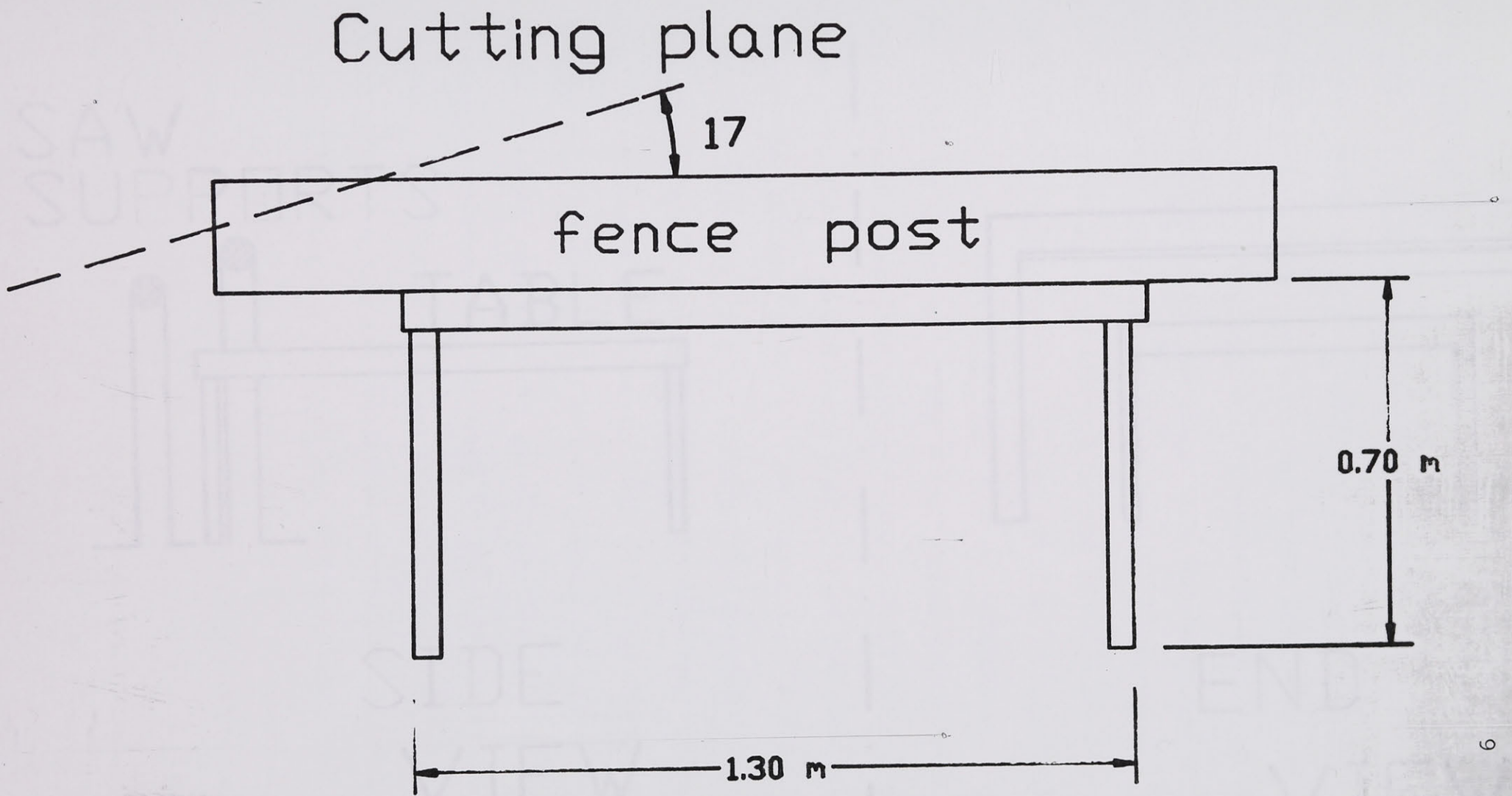
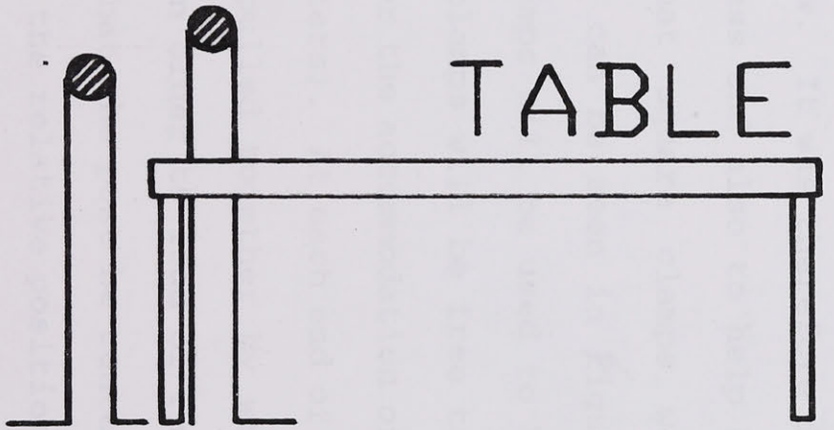


Figure #3 Set-up Alternative #3

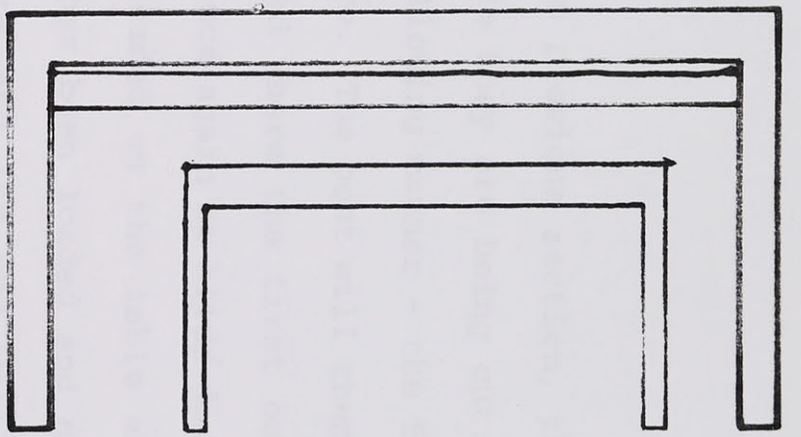
Dimensions?

SAW SUPPORTS

TABLE



SIDE VIEW



END VIEW

Figure #4 Final Set-up

DISCUSSION

As mentioned in the previous section, the table will be used to mount the posts while they are being cut. The system will be set up to run in the following manner - the first post will be set on the table and cut once. The post will then be rolled 90 degrees and a second post placed where the first one was originally. At that time the saw will once again be slide down its supports. Then a third post will be loaded on the table and finally a fourth. After the fourth post has been loaded and cut the original post will have had four cuts and its end will be sharpened. The original post will be taken off, the other three posts will be flipped 90 degrees and a new post put on. After this point, each table width cut of the saw will produce a sharpened post and allow room on the table for a fresh post. As described above, the system has been designed to work by rolling the posts 90 degrees after each cut of the saw. It was therefore decided that in order to facilitate this process and also to help hold the posts while they are being cut that square clamps would be used. An illustration of a clamp can be seen in figure #5. This figure demonstrates how the clamps will be used to hold the post in the middle of holder. The clamps will be free to rotate about a pin joint which will allow for the accommodation of various sized posts (measured by their diameters). At each end of the holder, the four clamp sections will be pulled together by way of a cinch device which will be loosened in order to load or remove a post from the holder.It is necessary that the post be centered in the holder so that as each cut is made the relative position of post and cutting

plane does not change. Figure #6 is an illustration of the rear view of the table showing the relative positions of the four posts.

avoid slang

attempting

One of the major drawbacks to tackling a project like this one is the lack of information to draw from. Many of the questions that must be answered before design specifications can be given are simply too difficult to answer without a lot of trial and error. For example: What are the power requirements for this system? This writer was unable to find such values and therefore tests must be run. How high should the table be? What should the angle of the cutting plane be? Will the post clamps work? What should be used to cinch the clamp sections together? These examples are just a sample of some of the questions which need to answered. To get the answers it would be necessary to complete a large number of tests and trials which was outside the scope of this project. The design outlined in this report represents the skeleton (or base idea) of the final design.

I am somewhat surprised that you were able to find no info on a related topic (sawmills)

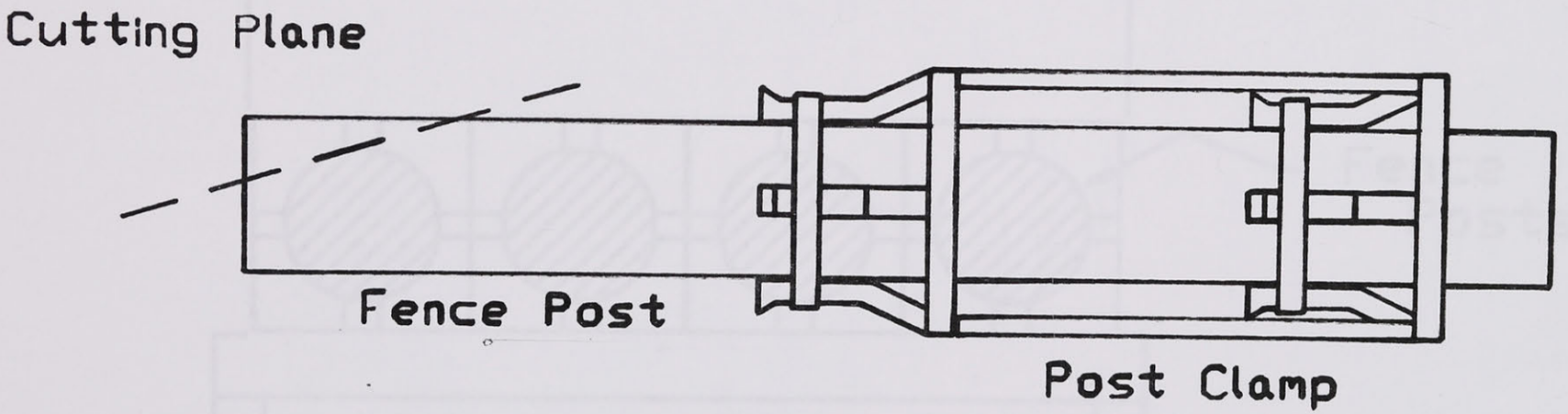


Figure #5 Post Holder and Clamp

Rear View of Cutting Table

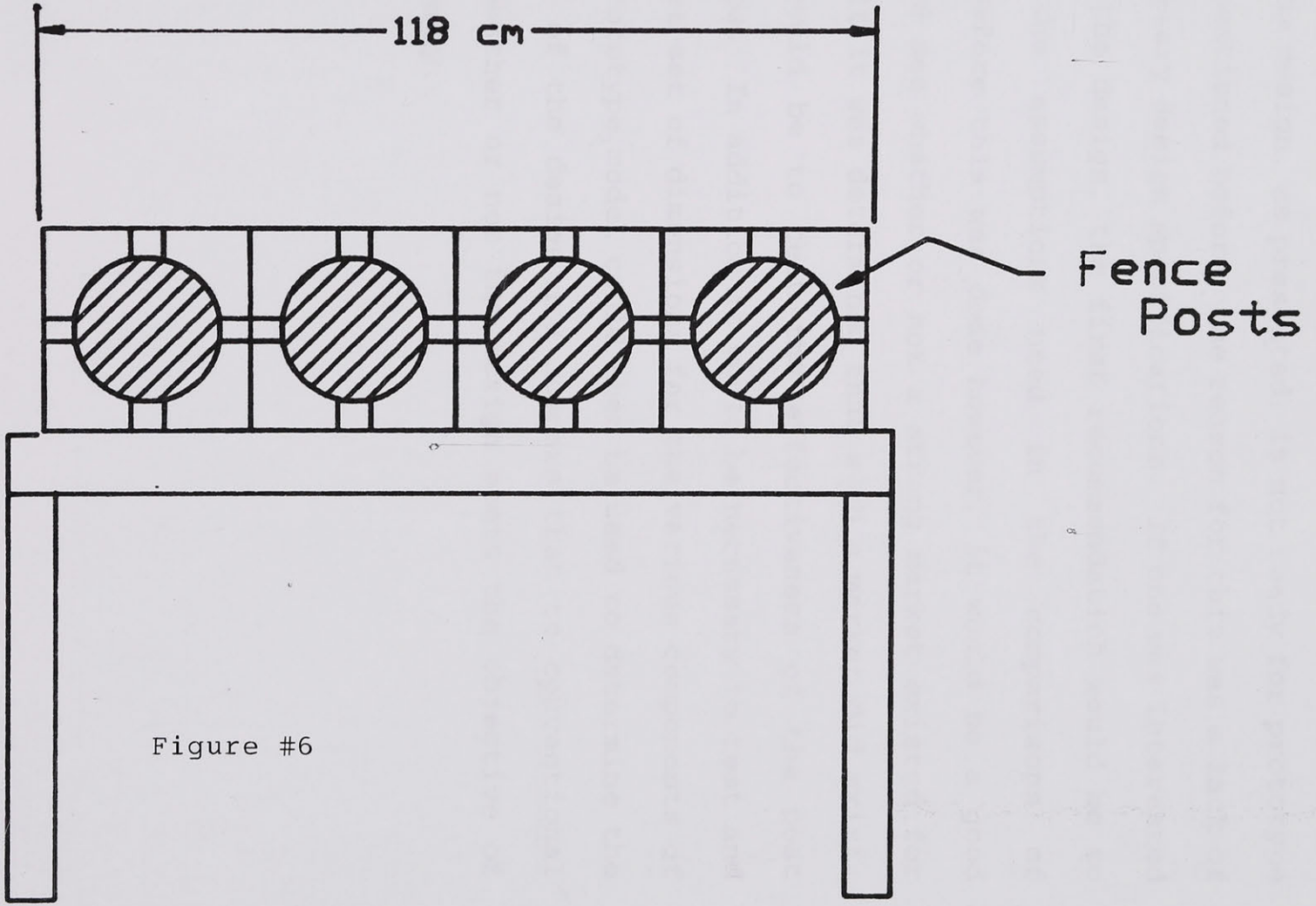


Figure #6

RECOMMENDATIONS

Obviously the design, as presented, is not ready for prototype production. As mentioned before, the reason for this was a lack of information necessary design specifications. If one was interested following up on the design, the first recommendation would be to somehow check the assumptions used in the comparisons of alternatives. Before this was done however, it would be a good idea to check and see whether or not a strong market existed for such a design. If it was determined that such a market did exist, the next step would be to test the effectiveness of the post holders and clamps. In addition it would be necessary to test and determine the best set of dimensions for the various components of the system. A prototype model could then be used to determine the output potential of the design and compare that to conventional values to test whether or not the design meets the objective of increased efficiency.

CONCLUSIONS

Various alternatives for the cutting tool were compared and it was decided the a circular saw blade would best meet the objectives of this project. In addition, various set-up alternatives were compared and it was decided that a horizontal table in combination with a vertical cutting plane was the best. Because there was so little information from which to draw, design specifications are missing. This indicates that before a final solution about the viability of such a design can be decided, further research is necessary. Even if a market for large scale production of such a design does not exist, it is likely that certain members of our rural population could ~~be benefitted~~ benefit by the ideas ~~generated~~ expressed in this report.