

# Craftsmans—Corner

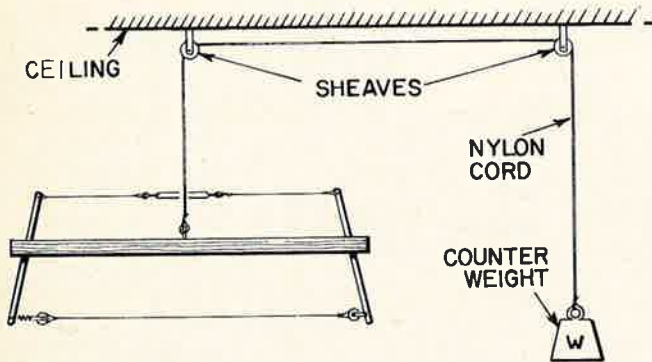
Edited by Chuck Larsen, EAA Designee Director

## SUSPENDED HOT WIRE "SAW"

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**W**E ARE PART of a group that is building Dragonflies, and since we were cutting a lot of wing cores, canard cores, etc., the problem of the hot wire saw causing arm fatigue and the tendency to "fight" the saw (case of trying to let the right hand know what the left hand is doing) came up immediately.

We solved this problem by suspending the hot wire saw from the ceiling using two small sheaves and a counterweight. The saw is tied to a piece of nylon cord at its balance point and through a sheave over the work table and another sheave at the side of the shop. We found that a single firebrick was just about right for the counterweight. (This, of course, will vary according to the weight of the hot wire saw.)

We found the results are amazing compared with trying to hold the saw with one hand and cutting with the other, and we were using a very light hot wire saw. The saw is counterweighted and takes only about the weight of a hand to make it drop to the work. We found it much easier to "one hand" the saw and control the cut.

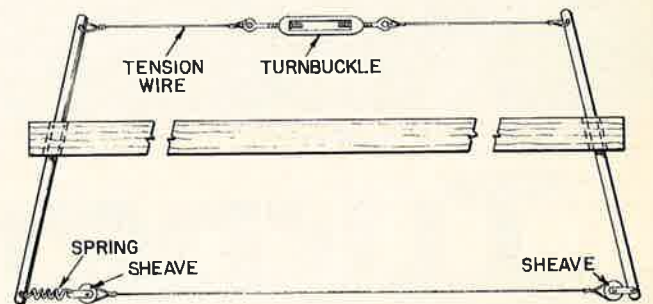
We only used single point suspension of the saw, but it's easy to see that with a little extra time and money the saw could be "tracked" (that is, the sheave above the table put on a track that is parallel to the direction of the cut) or a swivel arm could be constructed from the side of the shop to the work table. Another alternative is a bridle attached to each end of the wooden bar, which would "automatically" balance the saw.

We also tried a couple of new ideas with the hot wire saw which worked well. The first is the use of a lightweight turnbuckle as a tensioner across the top of the saw to tighten the cutting wire. The second is the use of a spring and two heat-proof sheaves to keep the wire in constant tension. The rationale here is a couple of bucks spent trying to keep the hot wire from breaking during a cut will save a lot of bucks that would have to be spent buying one, two or three new styrofoam billets.

The use of the spring and sheave allows the hot wire saw to be in constant tension hot or cold. The use of a heat proof sheave is to "ease" the wire and to position it below the arm of the hot wire saw. This "easing" of the wire over

a larger radius reduces strain induced by short radius bends and kinks. The spring is attached to one side of the arm of the hot wire saw located between the arm of the sheave. The spring should be selected according to the minimum tensile strength of the wire. For example, the minimum tensile of Nichrome V wire is the 100,000 P.S.I. We used .036 Nichrome V and by using a calculator we came up with the fact that the wire should support minimum pull of approximately 102 pounds. We could not easily find springs in different ratings so we purchased a one-inch coil spring that one man could just barely manage to open slightly by pulling on it with pliers. This spring probably has about a 50-75 pound pull. The idea, of course, is to get maximum tension without over-stressing the wire.

We also used a different approach to heating the wire. Some techniques call for heating the wire red hot and then backing off until the wire is no longer red. We used a technique of gradually increasing the heat until the wire cuts properly.



JIM NEWMAN

**NOTE:** The hot wire saw wooden cross piece must be made slightly longer than normal to accommodate the spring-sheave arrangement.

**NOTE:** If sheaves are heat-proof insulators (porcelain, glass bakelite, etc.) you must attach electric wire directly to hot wire. We made ours out of bakelite because we did not know what the heat would do to our coil spring or whether the spring would heat up. It very well might be that the sheaves could be metal and the electrical supply could be connected to the arms as it is shown in other designs.

### Operation:

1. Tighten turnbuckle until coils of the spring open.
2. Heat up saw gradually until proper "sizzle" sound is heard and "angel hair" appears at end of test cut.
3. Check the spring. If coils have closed, tighten the turnbuckle until coils open. This should (and it seems to) keep the wire in constant tension at 50-75% of its minimum tensile strength. This should prevent a lot of hot wire breakage.