

# THE HIVE TOOL

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## **President Frame**

Ah, sweet April! My favorite month of the beekeeping year. By now I've dealt with the depressing tasks of winter losses. I've cleaned the hives and combs, made my educated guesses about their demise, and set the colonies aright for spring packages and swarms. This is now the season of promise. This is when we look forward in eager anticipation to the coming honey year. This is when the real work begins.

I love working with bees in April. Most colonies are still relatively small making it easy to find the queen, and with so many young gentle bees it's a pleasure to go through the colonies, lingering to observe the familiar signs of spring - a solid pattern of brood, a greatly expanding brood nest with plentiful drone brood, copious amounts of fresh pollen and nectar, new comb being built, and lots of activity at the hive entrance. It's easy to learn and to recognize these obvious signs of colony health now.

Then there are the other colonies, the ones that require some attention - the dwindling colony or the one that seems to lack vigor, that remains small while others are expanding. Is it a failing queen? mites? insufficient stores? Should I feed them? treat them? give them a boost with brood from another colony? Or shall I just leave them alone, knowing that bees are amazingly resilient creatures that don't always behave the way we expect them to. Those are individual decisions each beekeeper must make, but I will say that over the years I have moved closer to the philosophy of do-little beekeeping. Unless I have a specific reason for doing something, based on close observation or desired outcome, I do nothing. And that includes all those times I'm just not sure - I do nothing (other than keep a close eye on things, keep good notes/records, wait and see what the bees will do). I've learned to trust the bees; their instincts are greater than my knowledge.

Then there are those other colonies, the ones that require some attention - the ones that are boiling over with bees, that came through the winter with a robust cluster and are likely to swarm without some intervention. I move frames of brood from strong colonies to equalize weaker colonies (being careful not to inadvertently move the queen). Other colonies I

divide and requeen to make up for winter losses (I buy early queens from several suppliers). Some colonies I divide and allow them to raise their own queens. The point being - one should identify and somehow manipulate those colonies which appear likely to swarm. Do it now! Some (maybe many) will swarm regardless. Still, be prepared. It's not a bad idea to have a bait hive or two near an apiary at this time of year. Even though I don't have any bees here on the farm at this time of year, there's enough stored equipment around that I always seem to attract a swarm or two from somewhere. Hey, free bees! I'll take 'em! Just another one of those wonderful April beekeeping experiences. Another reason April is my favorite month for beekeeping.

Oh, here's one more reason. At CMBA's April 3rd meeting we'll talk more about glorious spring and we'll be informed and entertained by Steve McDaniel, a professional nature photographer and frequent lecturer (also CMBA's VP). Steve's program is called "Love Is In the Air," about flowers and their insect pollinators, featuring many of Steve's outstanding photographs. Should be fun! Of course, we'll talk about the latest news on CCD, what's happening in the bee yard this month, Jerry will give us his perspective as State Apiarist, and there's always time for some questions and answers. Come at 7:00pm to enjoy some refreshments and bee talk and to meet some new beekeepers. I look forward to seeing you all there. Happy Spring!

## **What About That Boardman Feeder**

By Walt Wright

Reprinted from Bee Culture Feb 2007

If you use it correctly, check it for leaks, and keep the entrance reduced, this is a safe and trouble free way to feed.

Several months ago (midsummer '06) an extensive article was prepared on the boardman feeder. My contention in that treatment was that experienced beekeepers who knocked the Boardman didn't understand the principals on which it operates. Wanting to be on firm ground before submitting the article for publication, a PhD in physics was consulted. Wayne Long of Tullahoma, TN was kind enough to review my draft and offer critique. I suspect that we both learned something from the exercise. Having spent several months on the subject, and being burned

out on all the details, this submittal will shrink the treatment to a discussion of the important factors.

That should leave some space for a related subject - stimulative feeding in late winter / early spring. It is my opinion that stimulative feeding of syrup in the early season is a myth. The opinion is based mostly on observation of colony scheduling of activities, and there is no supporting data. The subject will be treated later in this submittal. You may ignore it at the risk of unwarranted time and expense.

#### Boardman Feeder - Discussion

The most consistent reason given for contempt of the device is that it "incites robbing." Robbing is not automatic with its use. To cause robbing some feed needs to be exposed on the outside of the hive. Stronger colonies in the area, finding feed exposed, will be inclined to callout more foragers to take advantage of the source. The worst case scenario is when robbing gets started, and the pressure is on the colony being fed, robbers overwhelm the weak colony, and take what little stores they had on the inside. It's less a problem when field forage is available, but in a nectar dearth, robbers can be vicious. It sometimes seems that stronger colonies form a temporary alliance to attack in greater strength.

The robbing campaign all starts with some feed exposed on the outside of the hive. Care taken in use of the Boardman can prevent exposed feed from attracting the attention of other colonies. Assuring the unit performs properly before installation and some care in application will provide trouble-free use. The unit that leaks, weeps, or seeps feed onto the landing board starts the big problems. Causes of weeping will be treated below in the order of significance.

First, let's counter a popular misconception. The airspace at the top of the inverted jar is often referred to as having a "vacuum." The implication is that the vacuum is holding up the weight of the feed. Not true. To have any significant reduced pressure below atmospheric, you must have a closed system, such as a tank or vessel of some sort. The Boardman jar is not closed to atmospheric pressure by virtue of the openings in the cap. There will be atmospheric pressure, or close to it, in the airspace at the top of the inverted jar.

What actually supports the weight of the feed (head pressure at the bottom) is surface tension across the holes in the cap. Surface tension is that property of fluids that causes a droplet to be round in free fall, or bead up on a dry surface. Surface tension has its limits. To be effective in holding back the weight of the feed, the holes in the cap must be tiny. The wider span of larger openings will cause some fluid to pass or weep. If the hole is large enough, the fluid will pour.

The bottom line is that before installation, the cap perforations need to be demonstrated to be small enough. The test described below can be performed with tap water. If the cap passes the test with tap water it will do better with the feed of your choice. Any feed has more surface tension than pure water.

When the jar is inverted with perforated cap, there is a stabilization time. A full jar stabilizes almost instantly, and the nearly empty jar takes longer. That's because the trapped air volume is more elastic than the water volume and it takes longer to equalize the competing physical forces, or reach equilibrium. For this test a half jar of water is used to average the stabilization time.

Another factor that can influence results of this test is inertia. Hold the jar relatively still. Upward motion of the jar, and the inertial effect on the water, can overcome the surface tension at the holes and punch water out at the holes. With that much background you are ready to test your cap hole size.

Invert the half-filled jar at eye level. The dribbling of water should stop in a few seconds. If it doesn't, you are already in trouble. A mildly oversized hole will continue to build a bead on the cap surface until it drips, then start a new bead. A significantly oversized hole will drip continuously. Either constitutes test failure. If there are just a few offenders, they can be plugged and retest performed. Otherwise, discard, and punch smaller holes in a replacement cap.

Now that you have a cap that meets the static fluid support requirements, you are not ready to use it with confidence. Conditions are not static in the beeyard. Ambient temperature change can affect seepage. Warming both fluid and air causes expansion of both. The only relief from expansion is to push fluid out at the bottom - another cause for seepage.

In the frosty morning period, where night-to-day temperature rise occurs while the colony is still clustered, some accumulation of feed is possible inside the Boardman. With properly sized holes in the cap, however, the accumulation is not normally enough to spill over onto the landing board.

Expansion rate of the feed can be increased by direct sun warming of the feed itself. Sun rays pass through the transparent jar and warm the not-so-transparent feed. The accelerated expansion of direct sun warming can be offset by shading the jar. We use a lunch-bag sized paper sack on our half gallon jars.

A couple other "just in case" recommendations are offered for your consideration. Just in case your Board man weeps after doing the best you can to avoid it, the following will tend to reduce robbing:

1. Install the feeder on the extreme outside of the

landing board - nearest the cluster.

2. Install a solid entry block to a small entry opening at the far side of the landing board.

3. Elevate the side rail on the entry side with shim stock such that the entry is higher than the feeder. With the feeder on the low side where potential overflow can be expected, there is no direct trail of feed to the entry to encourage invasion by the robbers.

A hundred Boardman feeders were ordered to go "all-up" on stimulative feeding. The caps provided with the units all weeped to some extent - some worse than others. The naive beekeeper, expecting to be sold a functional unit, thought that was normal performance. Using them in the early season, all the potential problems came into play. When we figured it out, it was resolved to someday write it up to keep others from having to endure the hardship. Someday was yesterday.

## **SUBJECT CHANGE**

Clear the slate; we are starting over on a new subject.

This topic is expected to encounter stiff resistance from the "old dogs." "Stimulative" feeding has been a literature mainstay for a long time. Taking the word stimulative at its dictionary meaning, we assume that improving colony growth rate is the objective. That assumption implies that the growth rate is accelerated by feeding the nectar substitute. The implication that the bees are misled into acting on nectar availability, and accelerate brood nest expansion is just another hand-me-down misconception from yesteryear. Keep in mind that my reservations on stimulative feeding are restricted to the feeding of syrup or nectar substitute. Feeding pollen or a pollen substitute is a different discussion, but in some ways relevant. Since I'm not there yet, it's difficult to predict how much of each is likely to be treated.

There are several situations where late winter feeding is beneficial. More severe colony needs could be considered mandatory feeding situations. Those situations are those that help is needed to sustain brood nest growth at normal rates. The well-provisioned colony does not need that help. The question being addressed here is whether or not the feeding of nectar substitute actually accelerates brood nest growth (stimulates.) Ok, so I'm a nit-picker. Let's get into it.

A little history might be appropriate. Having tried several other ways to supplement retirement income such as fertile eggs, meat rabbits, and beef cattle, three hives of bees were purchased. It was obvious that the other ventures were not the way to go. Buying feed at retail prices canceled out any potential profit. But the bees feed themselves. That's a big plus.

Spurred on by the first full season (a super year) beekeeping seemed like the way to go. In the second full year, a few swarms were collected to run the hive count up to 10 going into Winter. That 3rd Winter the tracheal mite penetrated the area and took out eight of 10. The two survivors, in essence, caused me to start over with a major obstacle to overcome.

Tracheal mite effects do the most damage over the Winter and into the early build up. It was imperative to become familiar with the build up process. There was not enough time in my schedule to sample mite infestation levels. This meant that judgments would be made on growth rates of the colonies. Written records were not kept at that time, but scrawled outlines of brood volume on the back were maintained on each hive opening with a permanent, felt-tipped marker, and dated. As the season progressed, a record of growth rate was conspicuous before popping the top. Slow developing colonies were inspected in greater detail.

The above background material is included to alert you to the fact that I had pretty good feel for growth rates before trying stimulative feeding. A second motivation for the trial was that medication for Nosema needed investigation. The feed was used as the carrier for the medication. After two full build up seasons of across-the-board stimulative feeding the effort was discontinued. There was no evidence that build up rates were accelerated by the extra work and expense, with well provisioned colonies.

Reflecting on the causes for this disappointment, it makes sense when you understand the bees' format for build up. Collectively, the following observations provide ample reasons for the ineffectiveness of feeding syrup to stimulate growth. Be advised that these personal observations have not been blessed by anyone that I know of. Most of these observations have been mentioned before as they relate to other subjects. This list is considered those that are relevant to build up rates. This list is also oriented to "well provisioned" colonies - those that met requirements for dependable wintering in the Fall.

1. The colony can roughly double brood volumes in each successive worker brood cycle. The doubling accounts for the "explosion" in the swarm prep season.

2. Brood nest expansion is limited by at least two factors: The amount of honey consumed by population and brood - freeing up cells for expansion. And the population of adult bees required to maintain brood rearing temperatures. In mid Winter the second has the greater impact. In late winter, honey consumption is the controlling factor.

3. Adult bees in early build up are mostly foragers.

This permits them to take better advantage of limited foraging opportunities.

4. The primary stimulation for full bore build up is pollen availability in the field. Early season foraging is predominately for pollen and water to thin honey for consumption. The colony in contact with overhead honey has little need for nectar if water is available.

5. The honey bee is greedy. They can't pass up free carbs, even if it is not in their best interest to do so. They will rob out less fortunate cousins when they have no place to store the booty.

6. In the build up period, the colony wants all cells filled within the cluster perimeter. With the exception of cells of honey being drained in the direction of expansion, filling empty cells with nectar is a high priority.

So what happens to the stimulative feed? One might suspect that individual bees are pressed into service as mini storage tankers. That's a major speculation, however. One thing we are sure of is that they are not going to throw it overboard. If the guess is actually correct, you may be doing the colony a disservice, since those bees would be taken out service for pollen foraging. That could slow expansion. The literature reports that northerly locations sometimes have a brood break in late Winter. The colony that has used all the residual Fall pollen puts brood rearing on hold pending field pollen availability. If that is true, it would seem reasonable to feed pollen or a substitute to stimulate. Only feed syrup to fill the brood nest. That would help. An internal water source might also be an asset. Or maybe that boardman feeder could be filled with water.

If you feel cheated out of a more comprehensive discussion of my opinion, go back and digest the content of the observations. It's all there. Although this was not intended to be a test of your deductive powers, you might come to the same conclusion that stimulative feeding of syrup can be counter productive. It seems to me that excessive feeding of syrup, when the objective is honey consumption for brood nest expansion, is pushing the colony in the wrong direction.

There is, however, a circumstance where feeding could accelerate expansion. That is the case where an empty deep is reversed in late winter. The bees are not going to expand into the empty deep until nectar is stored there first. If field nectar or flying weather is delayed, expansion is delayed. Feeding at reversal would speed up the process.

The recommendation from here is to take a hard look at stimulative feeding for your area. Keeping in mind that the doubling effect of normal brood nest expansion could mislead you into thinking the feeding is helping. If you get more than double the brood volume in a worker brood cycle, only then is stimulative feeding an asset for your location.

But you are building increased swarm potential

## **Making Frames The Basics of Assembly, Wiring & Using**

By Jim Tew

Reprinted from Bee Culture Feb 2007

### **Everything changes**

One way or the other, everything changes, and beekeeping is no exception - nor should it be. Change and development are indications that our industry is progressing and responding to the events of our day. For instance, basswood section comb honey equipment is very nearly gone from bee supply catalogs. Just a few years ago, entire books were available on the subject of producing comb honey in basswood boxes. But replacing the old ways are new ways of producing comb honey in various plastic containers. It's still comb honey, but just in a different container. As another example, queen producing appliances have changed greatly. Few of us still make our own beeswax cups opting instead to use reusable plastic cups. So it should not be surprising that changes in frame and foundation styles and procedures are occurring (and I welcome them). Beekeepers view these changes in different ways.

### **Beekeeper subgroups**

For no other reason than my own use, I have begun to categorize beekeepers as being either "traditional" beekeepers or "modern" beekeepers. Of course, most of you are hybrids between the two groups. Categorizing beekeepers helps me arrange for various presentations or written publications.

### **Modern beekeepers**

The new beekeepers of the day (modern beekeepers) correctly use the equipment and procedures of the day; hence, they use a lot of plastic in their beehives.

### **Traditional beekeepers**

Beekeepers who have been practicing the craft for years know many of the old procedures and still readily employ them (traditional beekeepers). Interestingly, bee supply companies still provide many of the old-style appliances for this group, but give almost no information on how to use these various devices. So, if you want a transformer and an electric wire embedder, you can readily buy one, but you need to know how to use it from past experience - not from any information you get from the catalog.

I suppose I am a reluctant modernist beekeeper. Clearly, a properly-assembled wooden frame that supports a sheet of wired, embedded wax foundation is a better frame than the lighter, single-piece plastic frame, and is lighter than those plastic frames that are heavy duty but don't rack. The lighter frames, when full, rack and twist causing honey to seep. Many plastic frames are frequently difficult to remove from the super with common hive tools. But, these frames require no assembly and are easy to put into box equipment. Labor shortages are a chronic problem for me, and many beekeepers. I don't miss putting frames together and installing foundation, but I can't afford to pay someone to else to do it. I have no choice but to (mostly) use plastic frames.

### Wood frame types

A book could be written on the myriad types of wood frames and wax foundation. Such a book would probably sell about 10 copies. Too bad. This hypothetical book would delineate part of the evolution of our industry from our earliest time. Yet, all these frames types have several features in common.

In previous articles, I have discussed the confusing characteristics of various frames and the foundation required to fill these frames. For your review, I have listed these articles at the end of this piece. However, here for one more time, for the new beekeepers who have an interest in the older ways, I would like to discuss the procedures and some quirks of assembling frames and installing foundation once again.

### Frame Assembly Suggestions For The New Traditional Beekeeper

The fundamentals of putting frames together are obvious, but some aspects of the task could be made clearer with a bit of discussion. Since no manufacturer, of which I am aware, still bevels opposing edges of end bars (I suspect this was always a useless feature anyway), there is really no way to put a frame together wrong, so, how to put it together right becomes the challenge.

### Eyelets

Consider this - Before assembling the frame, push the eyelets into the end bar holes. Most of us assemble the frame and then put the eyelets in place. My reason for this suggestion is that the metal eyelets, whose ultimate purpose will be to keep the wires from cutting the longitudinal grain of the end bar as the wire is pulled taut, can be laid flat on the work bench in order to put the eyelets in place. Because the frame flexes and is more cumbersome to grip if the frame is already assembled, pushing the eyelets in is more difficult.



Two eyelets installed in an end bar.

Even though it only costs about \$3.00, the eyelet punch is a useful, but mostly unnecessary, tool. Mine is always lost. Use a pair of needle-nose pliers, use a 1/8" line-up punch, use a scratch awl, or make an eyelet punch from a large nail. Cut the head and point from the nail, chuck it in a drill and as the drill slowly runs, file a point on the nail shaft that will fit into an eyelet. Now folks, don't do something with that running drill that I will have to hear about later - like getting your shirtsleeve caught on the rotating nail shaft, or like having the drill fall from the work bench and stab your foot.



Support pins are cotter-key looking devices sometimes called split-rivets. They are about 1" long and are split about half way down the length of the shaft. Support pins go through the end bar holes and grasp the edge of the foundation to hold it upright. For this reason, only metal edged foundation or plastic reinforced foundation should be used with support pins. (Even then, I'm not wild about them. Foundation can still bow in the center.)

Truth be known, most eyelet punches - even those commercially manufactured - frequently pull the eyelet back out once it's pushed into the end bar. That's annoying because there is very little place to grab the eyelet to keep it pushed into the end bar. So consider this .... while the end bar is in the unassembled state, using the eyelet punch of your choice, get most of the eyelet into the end bar hole, remove the eyelet punch and then tap the protruding eyelet in snugly with a hammer. No way for the eyelet to be pulled out when using the hammer technique.

### Nails

Historically, 1 1/4" nails were used to assemble frames. Two on each end of the top bar, one through the side of each end bar into the top bar, and two on each end of the bottom bar was the time-honored way of nailing a frame together. If you are honoring the old ways, that's the only way to go, otherwise, put a dollop of the newer moisture resistant glues now available to glue the end bar to the top bar. Glue relegates the nails to nothing more than a clamping device to hold the

frame together as the glue dries. So what's the ruling here, traditional beekeepers? If I use glue and a pneumatic pin driver to assemble the frame, am I too far from the old way? The glue/pin process sure makes a good joint on the frame parts.

Using whatever connectors you choose, assemble the frame. Normally, the top bar wedge is left in place for now, but occasionally one breaks out. No big deal, but keep up with it. You'll need it later.

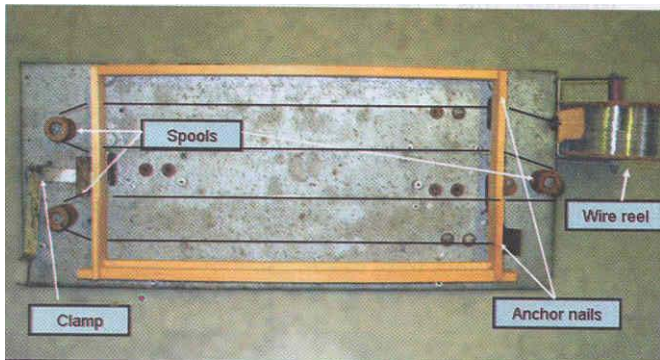
Wayward nails or pins can be a challenge. Nailing through the top bar into the longitudinal wood grain of the end bar can make the nail or pin, depending on what you used, bend and pop out. Do whatever you have to do to correct the situation. Pull the nail back out, clip it off, or bend it over (worst choice). I suspect you will need to use your drill and a small bit to punch a pilot hole before the nail can be properly driven. If you used a pneumatic pin driver, you will have to pull the pin through. I have never been able to drive a pin backwards. The pins frequently have friction-heat activated glue on them. They really want to stay where they stop.

### Frame nailing devices

Frame-nailing devices are now only found at places like estate auctions or on-line auction services. Supposedly, 10 frames could be held in place for nailing/gluing so an entire box could (theoretically) be assembled at once. In my opinion - a nailing device took too long to set up, was too inaccurate, and was clumsy to get the assembled frames released. If you see one of these gadgets going cheap, it's okay to buy one, but don't expect to make great use of it.

Okay, may I assume that you have assembled at least one frame by this point in the traditional frame assembly process? Next step - the dreaded wiring board.

### The wiring board



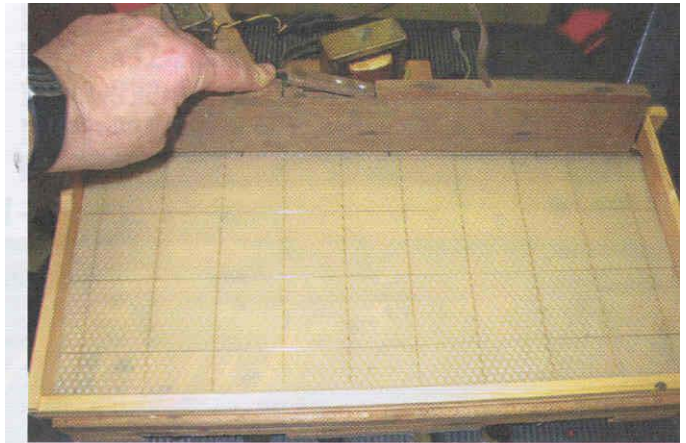
Frame wiring board. (Wire shown in black for clarity.)

What does a wiring board have in common with an eyelet punch? Both are useful but not necessary. In years past, wiring boards were elaborate devices with electrical contacts, wire spools, and stops to hold the

frame in the proper position. The few wiring boards being offered today are highly simplified versions compared to the older versions (but at least you can still get something).

### The Basic Frame-Wiring Procedure

1. On the assembled frame, already having eyelets in the end bar holes, partially drive two short nails near the upper and lower holes on the edge of the end bar. These will be the sites that you tie the wire off.



An electric wire embedder melting support wires into the foundation.

2. If using a wiring board, install the frame on the wiring board and set holding clamp if one is present. Different wiring boards use different techniques for holding frames.
3. Depending on the location of the wire spool, begin threading the wire through either the upper or lower eyelet hole. Upon getting to the end of the run and at the hole farthest from the spool, wrap the end of the wire around the nail. Finish driving the nail flush and break off the wire remnant.
4. Work the slackness out of the threaded wire. Tweak the wire, all the while rolling the slack wire back onto the wire reel. Your right hand holds the spool while the left hand does the tweaking. The wire should be tense, but not banjo-string tight. This frame will never be a musical instrument.
5. If the wiring board has spools, slip the wire off the spools and again wind surplus wire back onto the spool. Tweak again. The spools primarily prevent kinks in the wire.
6. While holding the wire in a tense state, twist the end of the wire about three times around the nail stub nearest the wire spool. Drive the nail flush and twist the wire until it breaks off. The wire should be

twang-tight but again, not excessively tight. Having three hands will help with this step.

7. If present, release the wiring board clamp and remove the wired frame from the device.

### Some comments on wiring frames

1. Partially drive anchor nails on end bars before placing the frame on the wiring device. The device provides a springy surface that is not conducive for nail driving.
2. Kinks in the wire will usually result in the wire breaking when it is pulled taut.
3. Again, it is important that the wire should only be tight enough to hold the foundation upright and in place.
4. Wire strands nearest the spool will probably be tighter than strands farthest from the spool. The wire tends to bind where it passes through the eyelets. As much as possible, correct this situation.

### Installing foundation

The wood cleat should now be broken from the top bar. Any rough splinters should be trimmed with a sharp knife. Depending on the type of bottom bar, the foundation is either put through or set between the bottom bar halves while the top of the foundation sheet is dropped into the top bar slot. The sheet should fit neatly and tightly. If present, foundation hooks should be captured underneath the foundation cleat. The cleat, now holding the foundation in place, should be lightly tacked with two - three '12" nails. Though still loosely contained, the foundation sheet should look fairly flat.

### Embedding wires in foundation

An embedding board is nothing more than a simple board that will fit inside the perimeter of the frame. The board provides a firm foundation for the wire embedding process.

Using either an electric wire embedder or a spur wire embedder, the horizontal wires will need to be pressed into the foundation sheet. While a bit more complex to use, the electric embedder does a better job, but the spur wire embedder is much simpler and faster to use.

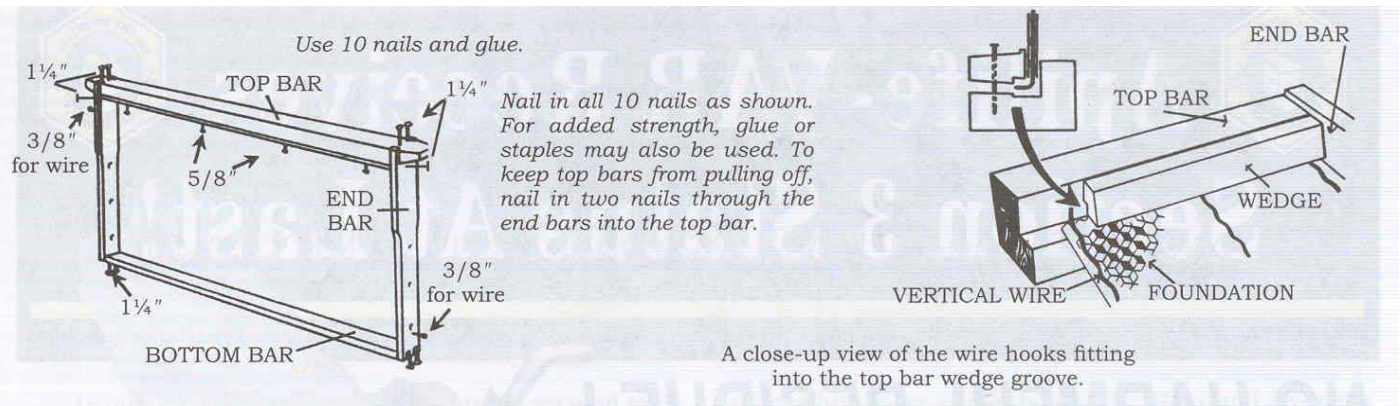
Electric wire embedders are available from bee supply sources. Using a small transformer (or an electric train transformer or a battery charger), the electric wire embedder slightly heats the horizontal wire which in turn, lightly melts the wax foundation surface just beneath the wire. The wire sinks into the molten wax. Release the electrical current, but hold the embedder in place for a few seconds while the wax hardens around the wire.

The purpose of the wiring, both horizontal (provided by the beekeeper) and vertical (provided by the manufacturer) is to hold the foundation in place while the bees build comb on it and second, to provide strength to the comb during the extracting procedure.

Again, a little heat goes a long way. Too much heat will quickly melt gaping holes in the foundation sheet. Ironically, the bees will repair such holes, but they will frequently be repaired with drone comb.

### The finished frame

Clearly, this is not an insignificant amount of work per frame. But when you finish and admire the new pine frame giving off a beeswax aroma - foundation flat - wires all nice and tight, you feel good about your work. As is so often the case in beekeeping, doing a few is pure enjoyment while doing a lot more is pure work. You decide where your line is.



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## **DATES TO REMEMBER**

General Meeting – April 3, 2007–7:30 PM at Oregon Ridge Nature Center. Our speaker this month is Steve McDaniel. The Subject matter is - "Love Is In the Air," about flowers and their insect pollinators, featuring many of Steve's outstanding photographs.

Board Meeting – April 16, 2007 – 7 PM at Oregon Ridge Nature Center.

General Meeting – May 1, 2007–7:30 PM at Oregon Ridge Nature Center.

Board Meeting – May 21, 2007 – 7 PM at Oregon Ridge Nature Center.

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