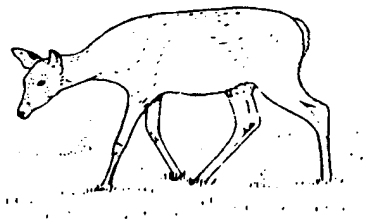
# Deer and Agriculture In West Virginia



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## High Tensile Woven and Smooth Wire Non-Electric Deer Fence

Woven wire fence with out-rigger and barbed wire at top has been used for many years in the U.S. as deer fence for preserves, parks and game farms. High tensile (HT) woven wire fence, originally developed over 10 years ago in New Zealand for deer farming, is now being marketed in the U.S. Considered the ultimate in effective deer fencing, high tensile woven wire is Class III galvanized with 2.5 times heavier zinc coating than the Class I previously used for most fence wire, so it should last considerably longer. HT woven wire is presently available in 49 and 75-inch heights. A minimum of one strand of HT smooth wire is recommended on top the woven wire and total fence height should be no less than 84 inches for low to moderate deer pressure (Figure 1). Additional wires are added to provide up to a 12-foot fence. As expected, cost is higher than other types of anti-deer fence—both material and construction labor. However, less maintenance is required.

### BRACE ASSEMBLY INSTALLATION

Brace assemblies for HT woven wire fence are constructed the same as for HT smooth wire except that post lengths are considerably longer. Although HT woven wire may not be tensioned to the degree that HT smooth wire is, tremendous pull is exerted on end and corner posts. Sturdy, well braced assemblies are absolutely necessary for the fence to function properly over a long time period. Pressure preservative treated (PPT) pine posts are preferred because of more uniform size and they are easier to work with than most locust and other type posts. The longer post length creates a problem for most post drivers. Special boom or other high mounted post drivers are required. Posts can be set by augering or hand-digging partial-depth holes to accommodate the post driver. Post length will vary depending on fence height desired. Some special equipment needed for HT fence construction is illustrated in Figure 2.

While pilot hole with driven posts is the preferred way to set end and brace posts, in some soils it is possible to drive posts without a pilot hole. It is also possible to satisfactorily hand-set posts in dug holes, but driven posts have initially about five times the holding strength of hand-set posts. To hand-set a post, a hole is augered or hand-dug a minimum 4-foot deep and shaped with a bell bottom. Prior to placing post in the hole, a ring of 2-inch galvanized staples is driven halfway in around circumference of the post about 2 inches from large end. Post is set and backfilled with an 8-inch layer of tightly tamped dry concrete mix in the bottom, followed by tamped soil up to about a foot below grade where a second 8-inch layer of dry concrete mix is added, then topped with soil to ground level. Soil moisture will set the concrete mix to help provide post withdrawal resistance and prevent lateral movement.

The horizontal brace rail should be a minimum 4" diameter 10-foot length of pressure preservative treated wood or 2-inch schedule 40 galvanized pipe pinned to posts with galvanized brace pins (Figure 3 and Table 1). Brace height should be about height of fence for lower fences and from one-half to two-thirds the height for higher fences. A double brace assembly is needed except for very short runs. For the first brace (at end) a double wrap HT brace wire is placed diagonally from the bottom of the end post around first brace post on top of rail. Because HT wire is stiff and springy, leather gloves and goggles should be worn when working with it to protect hands and eyes. The brace wire is stapled to bottom of post and wire ends are overlapped and spliced by stapling tightly to brace post as illustrated in Figure 3. For the second brace (away from end) a double wrap HT brace wire is also placed diagonally from the bottom of first brace post to top of second brace pin projecting out of brace post. The brace wire is stapled and spliced as above. A PPT hardwood twitch stick is placed to twist and

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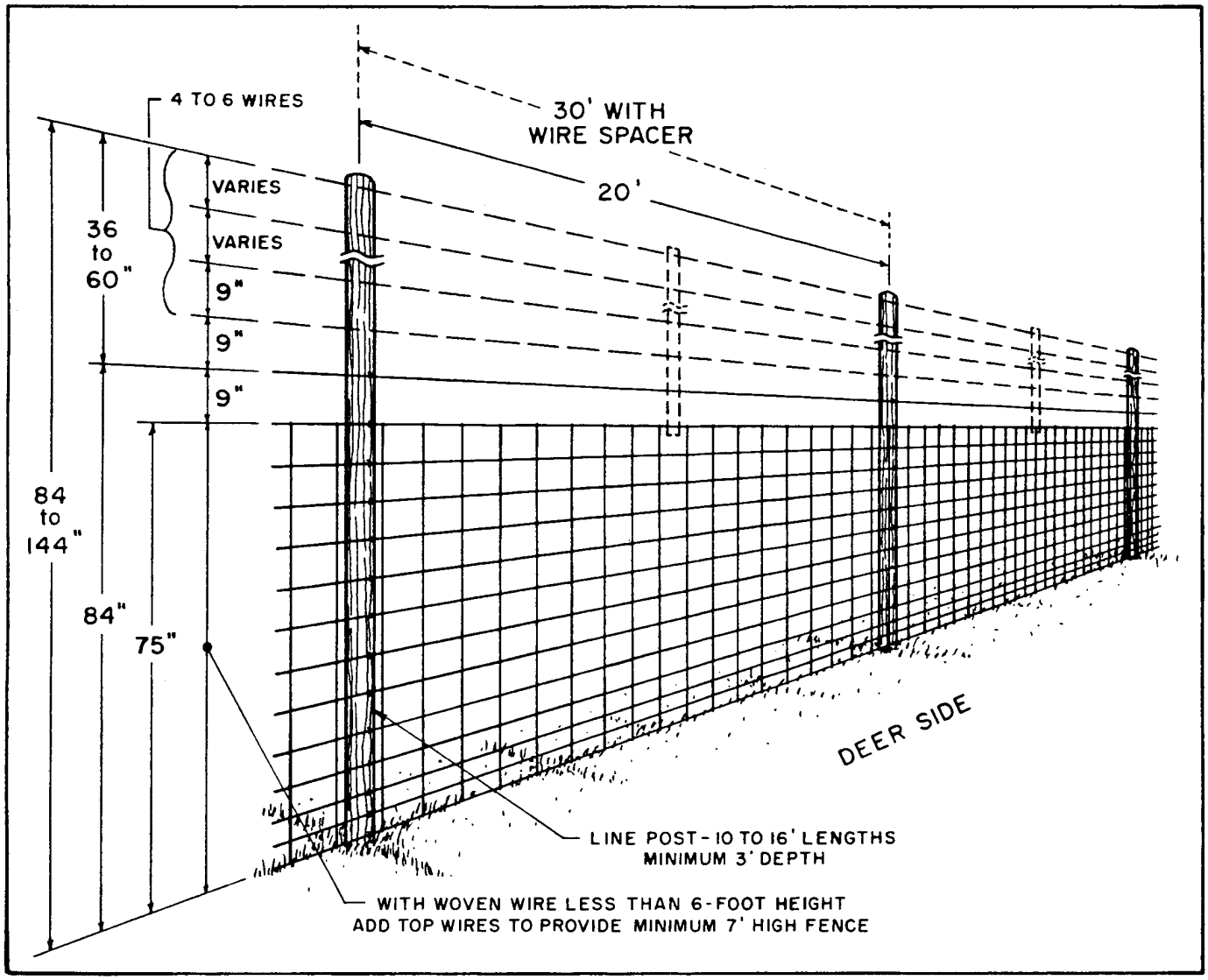


**Figure 1. High Tensile and Smooth Wire Non-Electrical Deer Fence**

tighten the brace wires to transmit force through horizontal brace rails to counteract pull on end or corner post created by tensioned line wires. The twitch stick should be securely fastened in place against the brace rail for safety as detailed in Figure 3. Horizontal corner brace assembly is the same as end bracing, except two-directional.

Diagonal bracing is preferred in rocky or hard soil where driving or setting posts is difficult (Figure 4). The floating foot and galvanized brace rod in the diagonal assembly provides strength equal to a double horizontal brace assembly while requiring less material. The 6-inch post is driven, small end down, with post driver after pilot hole is drilled or may be hand-set, large end down to a depth of 4 to 5 feet. Generally, it is recommended that end posts be set to depth equal to fence height, but this may not always be practical with such a high fence. Diagonal brace configuration for different corner angles is illustrated in Figure 5. All end, corner, direction change and intermediate brace assemblies should be constructed before beginning

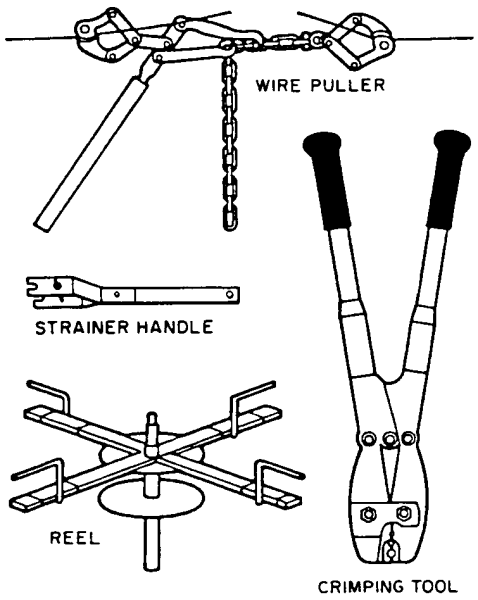


**Figure 2. Special Equipment for Constructing High Tensile Fence**

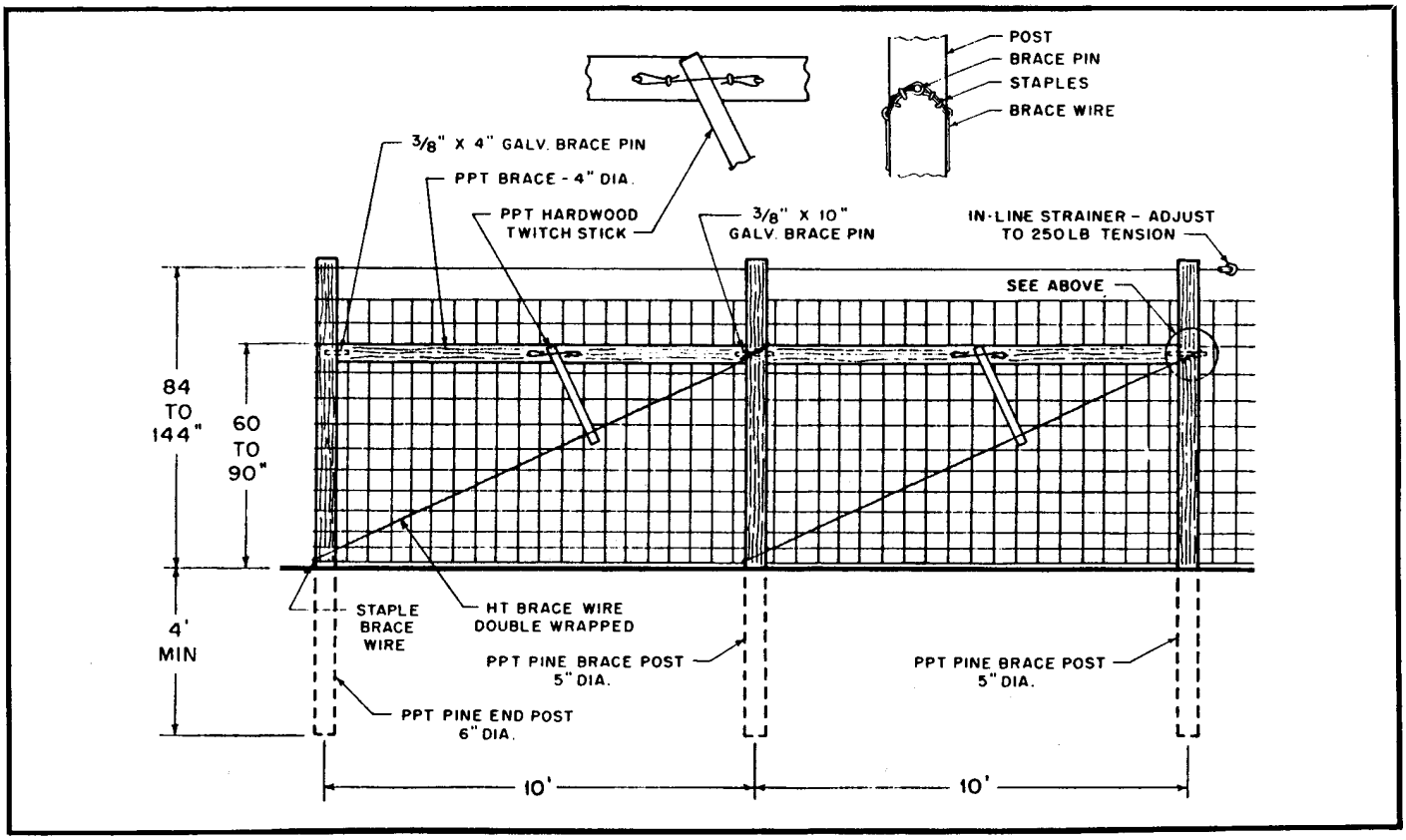


**Figure 3. Double Horizontal Brace Assembly**

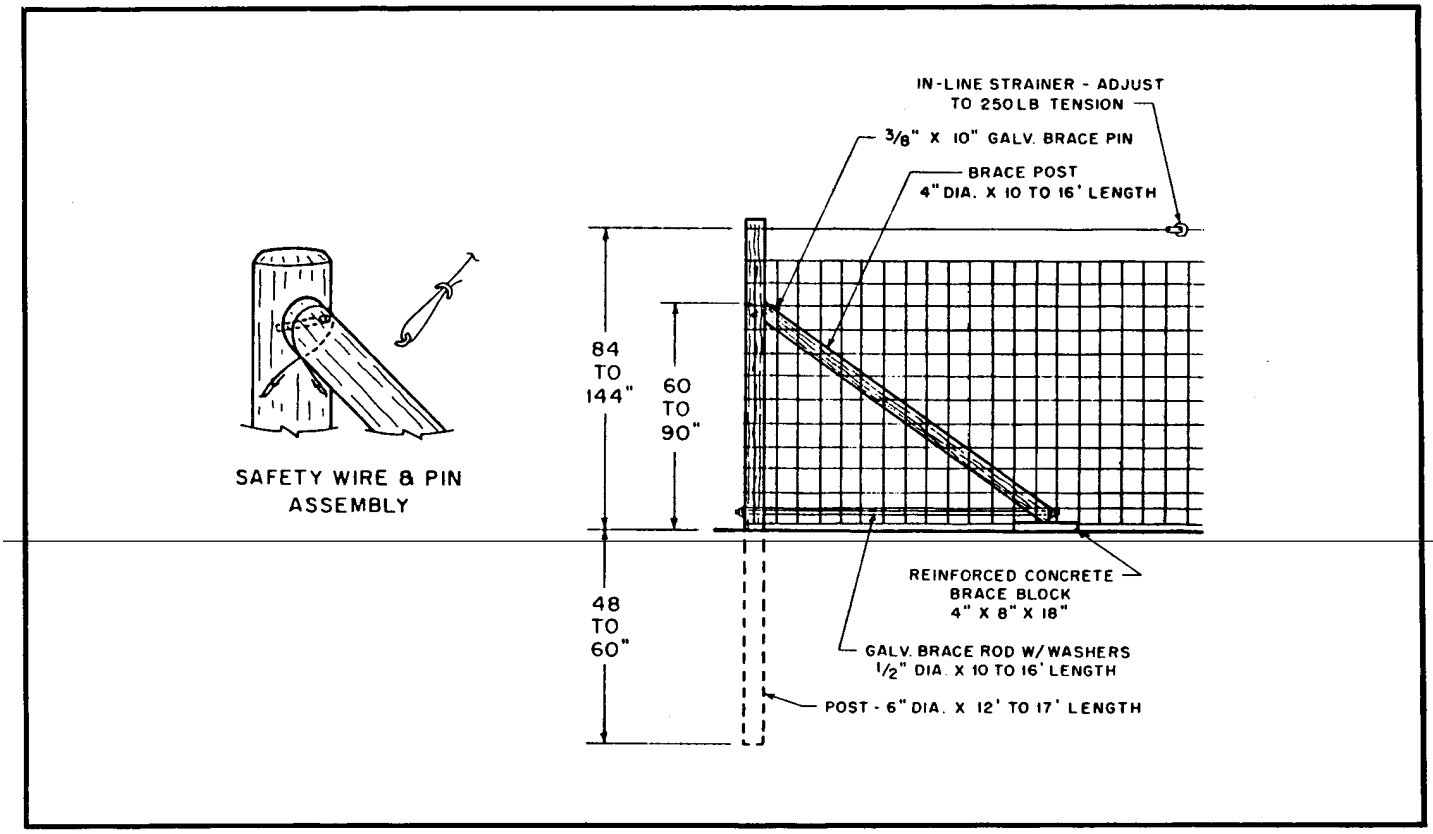


**Figure 4. Diagonal Brace Assembly**

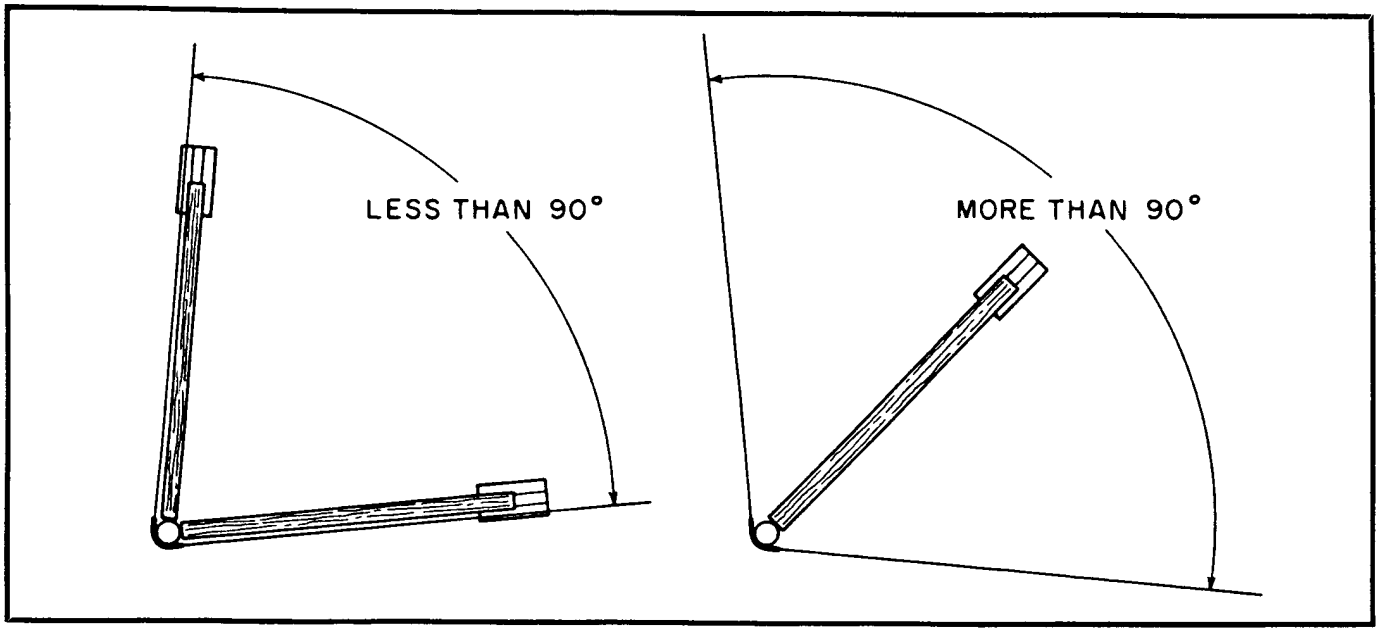


Figure 5. Diagonal Brace Configuration for Different Corner Angles

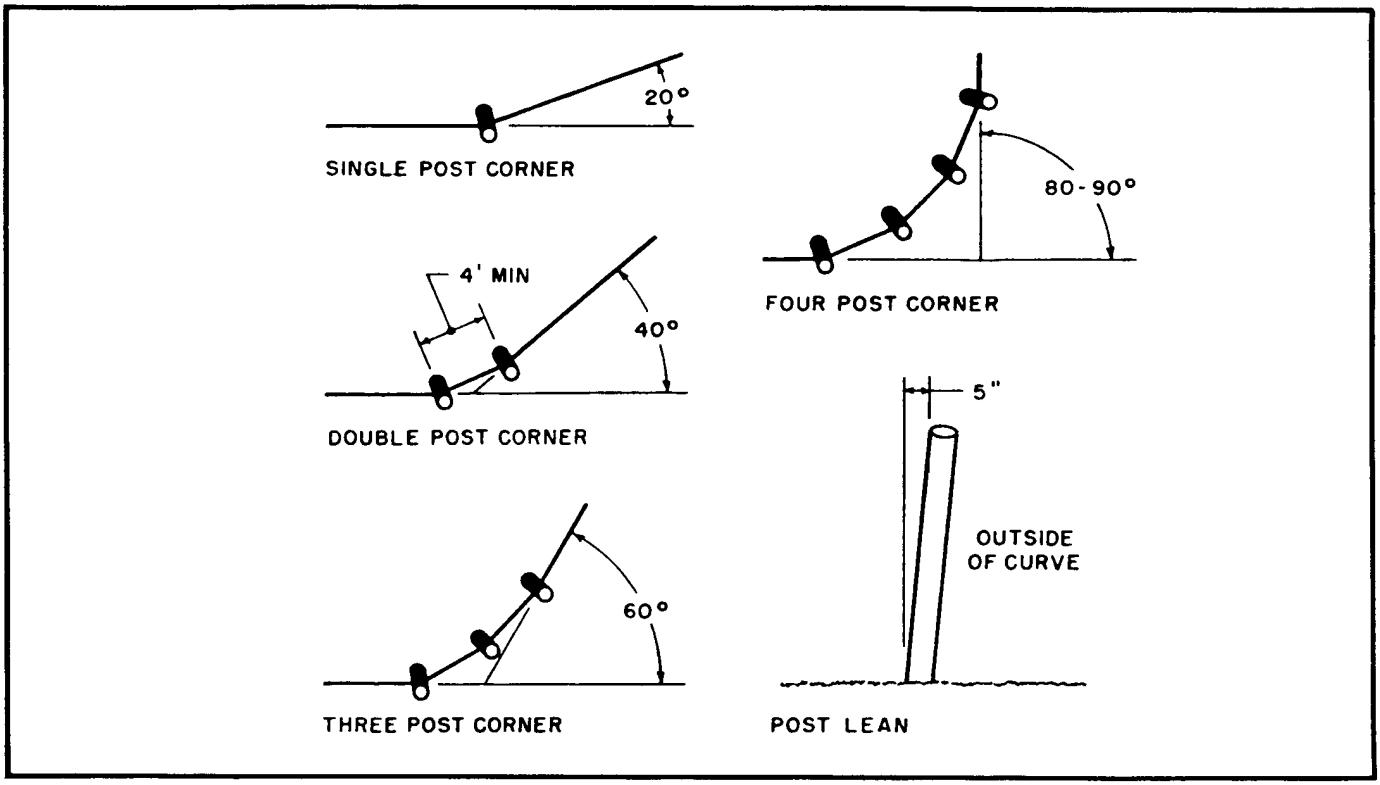


Figure 6. Corners Constructed with Posts Leaned

wire installation. Figure 6 illustrates close spaced "leaned" post construction without braces for fence direction changes up to 90 degrees. These posts must be set deep and sturdily.

A strand of HT smooth wire is tied off and run out to end of run where it is temporarily tied off with the chain wire puller. This wire is then used as a guide wire for setting line posts. This wire can later be placed permanently as the first wire above the woven wire. Line posts are driven or set at minimum 3 foot depth, normally at 20-foot spacing or at 30-foot spacing when intermediate wire spacers are used. Closer spacing may be necessary on uneven terrain. Line posts should be minimum 4-inch diameter on smaller end.

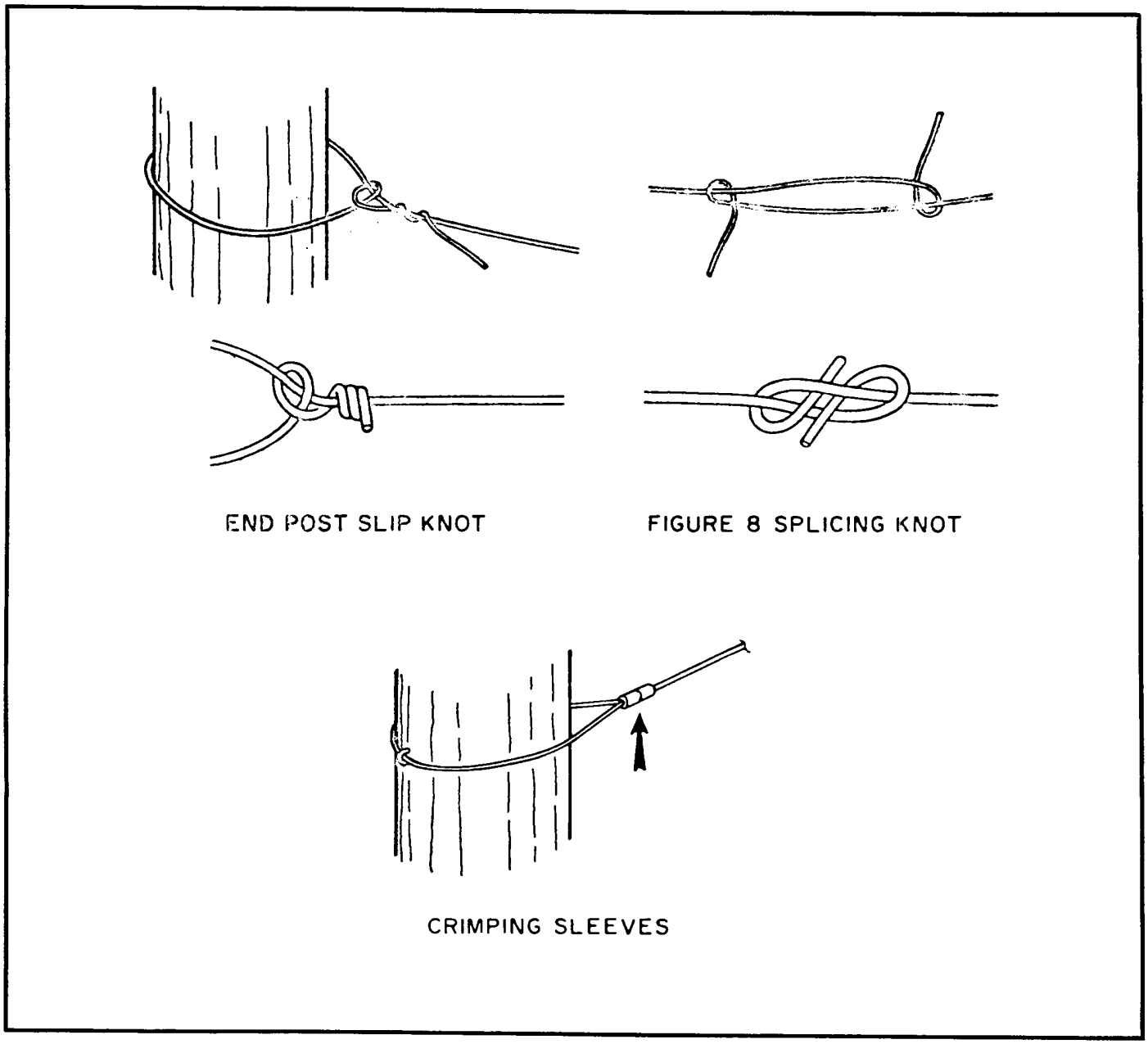


**Figure 7. Wire Connections**

## WOVEN WIRE INSTALLATION

High tensile woven wire installation is basically the same as for other woven wire. Line wires are tied off with two crimping sleeves using a special crimping tool or with wire knots (Figure 7). A woven wire type fence stretcher is needed to stretch the wire for tie off at end of run. The wire is stretched to flatten the line wire tension crimps half way. This stretch amounts to about 5 feet per 20 rods. Woven wire can be carried around corner or small change of directions without tying off on fairly level situations. For slope changes in straight runs or at corners, for example, from a level run to an uphill or downhill run the wire must be cut and tied off to post or spliced.

Class III galvanized or hot-dipped galvanized 1¾ to 2-inch, 8 or 9 gauge staples are used for softwood posts. Shorter staples are available for hardwood. Staples should be rotated and driven at an angle to straddle the post wood grain to reduce splitting and provide maximum holding strength. Rotating the staple to 45 degrees off vertical from the flat slash cut surface as indicated in Figure 8 causes legs of staple to spread resulting in 40% more holding power. Staples should be driven snug, but not locked tight to prevent wire from sliding on the post. Stapling over stay wires should be avoided and, to the extent possible, staples should be driven an inch or so away from stay wires.

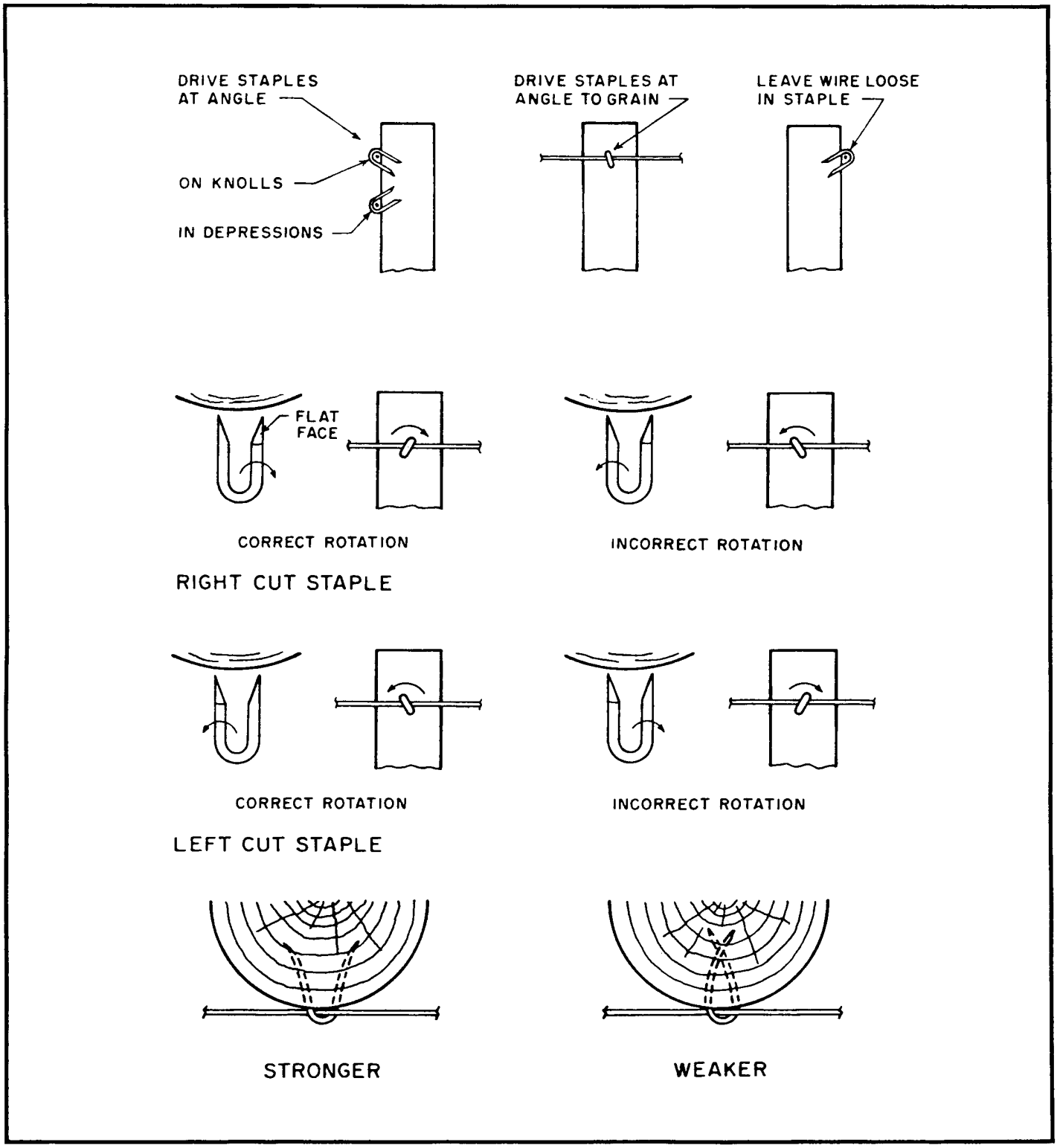


**Figure 8. Proper Stapling**

## SMOOTH WIRE INSTALLATION

High tensile smooth wire is packaged in 2160 or 4000-foot coils. Wires are run out either one wire at a time with a spinning jenny or with a multiple-wire fencer. Spinning jennies are available for purchase or rent (Figure 2). A home-made wire dispenser suitable for small jobs can be made from a 20-gallon metal trash can, a 3 to 4-foot square piece of ⅝-inch or thicker plywood and threaded steel rod. The rod extends through a hole drilled in center of plywood base to a hole drilled in bottom center of the can (placed upside down on plywood base). Washers and nuts are used to tighten can to base. The coil of wire fits over the slightly tapered can and will rotate around the can as wire is pulled out. Handles on trash can may have to be removed.

Depending on fence height desired, 4 to 6 wires are used in addition to the one wire recommended to always be placed on top of HT woven fence (Figure 1). The additional wires are tied off with two crimping sleeves or wire knots and stapled in position on end post following stapling procedure discussed above. A wire space marking stick is convenient for marking wire location on posts. Wires are run out to end of run and pulled taut by hand or with the chain wire puller. Initial tautness will depend on length and straightness of run and terrain—judgment is needed to determine allowance for dips. Temporary tie-off may be necessary until wires are positioned and attached to some of the line posts.

After the wires are tied off and stapled in position on the end post, the chain wire puller is used to install in-line strainers. A tension indicator spring, rated at a given tension per change in length, is usually installed on one wire. Proper tension in remaining line wires is obtained by hand feel comparison to the spring tensioned wire. The tension indicator spring and in-line strainer are installed by pulling up line wire with wire puller, cutting out excess wire, attaching one end of wire to indicator spring with two crimping sleeves or a wire knot. The other end of indicator spring is threaded through hole in yoke of in-line strainer. The second wire end is then inserted in hole in the strainer ratchet spool. By engaging the strainer handle or a wrench to the ratchet spool, the wire is spooled to tighten to proper tension and locked in place. Remaining in-line strainers are installed without indicator spring by attaching the first wire end directly to strainer yoke. The ratcheting in-line strainer permits seasonal adjustment of wires for temperature changes.

For line post spacing of 30 feet, PPT hardwood wire spacers (battens) are installed between posts (Figures 1 and 9). The bottom of the wire spacer is attached to the top strand of the woven wire.

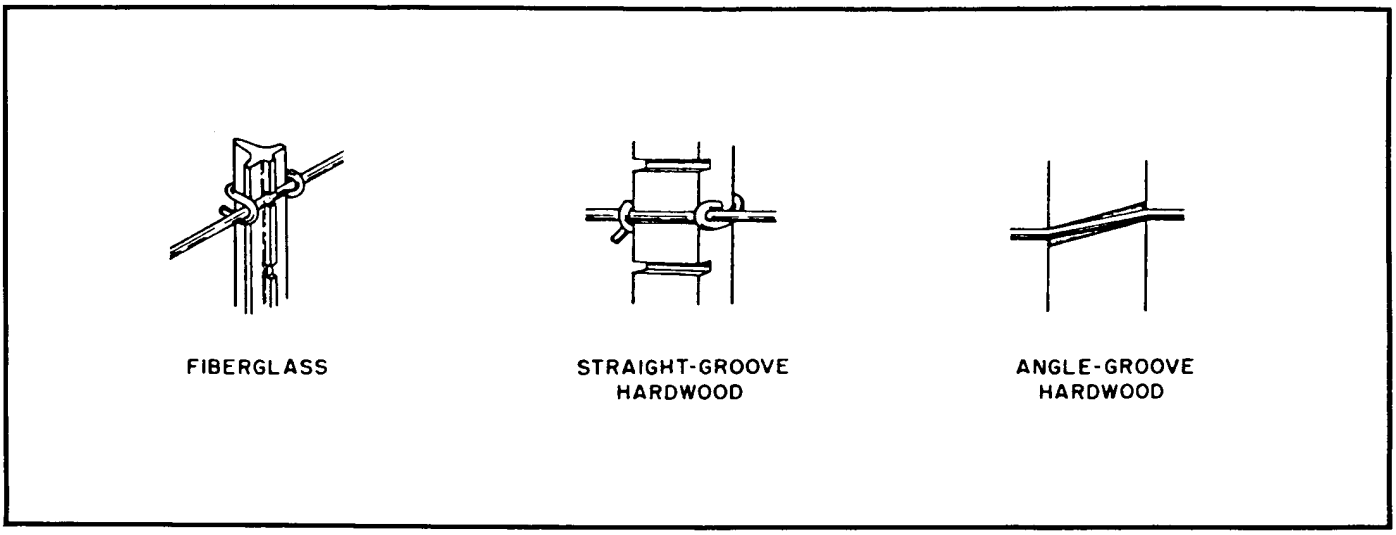


**Figure 9. Wire Spacers: Battens, T-Post**

**TABLE 1. Specification for High Tensile and Smooth Wire Non-Electric Deer Fence**

| | Dimensions | Installation |
|---|---|---|
| **POSTS** | | |
| End or corner (with bracing) | 6" Dia. x 11 to 17' Lg PPT pine or untreated locust | Minimum 4' depth, driven or hand-set. |
| Corner or direction change (no brace) | 6" Dia. x 11 to 17' Lg PPT pine or untreated locust | Minimum 4' depth, driven or hand-set, space 4' minimum. Lean 5" to outside of bend: Single post 20° bend; Two post 40° bend; Three post 60° bend; Four post 80-90° bend (See Fig. 6). |
| Line posts | 5" Dia x 10 to 16' Lg PPT pine or untreated locust | Minimum 4' depth, driven or hand-set on all rises and depressions. 30' maximum spacing with wire spacers (battens) between line posts, 20' max. spacing if no battens. |
| Battens or droppers | 40 to 60" PPT hard-wood, various sizes | Install on smooth wires at midpoint between posts. |
| **BRACING** | | |
| Brace posts | 5" Dia x 11 to 17' Lg PPT pine or untreated locust | Minimum 4' depth, driven or hand-set. |
| Brace rail | 4" Dia x 10 to 16' Lg PPT pine or 2" galv. steel pipe | Double brace assembly needed except for very short runs. Install horizonal brace rail at two-thirds the height for lower fences, one-half to two-thirds the height for higher fences. Diagonal brace rail at same height on end or corner post. |
| Brace pins | Galvanized ⅜" Dia steel rod, 10" and 4" Lg | Pin brace rail to posts both ends. |
| Brace wire | HT galvanized | Horizontal brace—double wrap, staple ends to post, tighten with twitch stick. (See Fig. 3) |
| Brace rod | Galvanized ½" Dia steel rod | Diagonal brace—thread through bottom of end post and brace on top of floating foot. (See Fig. 4) |
| **WIRE** | | |
| Type: | HT Class III galvanized woven fence wire, 49 and 75" height. 12½ gauge HT Class III galvanized smooth wire. | |
| Tension: | HT woven—stretch to flatten wire tension crimps half-way (about 5' per 20 rods). HT smooth—250 lb | |
| Strainers: | HT woven—wire type fence stretcher; HT smooth—in-line ratchet spool and yoke, galvanized. | |
| Tension indicator: | For smooth wires, in-line tension spring, specified tension per unit length change. | |
| Spacing: | Woven—variable; Smooth wires—9" for first two wires above woven, varies for additional strands. | |
| Fastening: | 1¾ to 2" Class III or hot dipped galvanized staples. Certain wire knots or crimping sleeves for splicing end connections. | |

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