DROP AND BLOCK WIRING
POLE, STRAND, AND TREE ATTACHMENTS
CLIMBING SPACE

CONTENTS PAGE

1. GENERAL

1.01 This section covers the description, installation, and arrangement of pole, strand, and tree attachments, climbing space, and general information on drop wiring.

1.02 This section is reissued to:

(a) Introduce the use of the 400-2000A Wire Terminal for use in party line bridges.

(b) Show the use of wire guards for the mechanical protection of drop wires.

Since this is a general revision, arrows normally used to denote changes are omitted.

2. CLIMBING SPACE

2.01 Climbing space is an unobstructed vertical space along the side of a pole. In general, it consists of an imaginary box at least 30 inches on each side and extending at least 40 inches above the highest telephone cable, wire, crossarm, etc, and 40 inches below the lowest telephone cable, wire, crossarm, etc.

2.02 The requirements for climbing space are based upon the 1984 National Electrical Safety Code. These requirements apply in all loading areas unless state rules, municipal requirements, or local arrangements with other utilities call for greater values.

2.03 Provision of climbing space is required by the National Electrical Safety Code and is generally specified as one of the conditions for joint use with the electric utility.

Note: Lack of adequate climbing space may endanger or hinder workers in the performance of their duties and increase the likelihood of plant damage.

2.04 Full climbing space, must be provided and maintained on all joint poles carrying power conductors of over 750 volts. Do not obstruct climbing space with drop wires. Examples of how climbing space is maintained when drop wires are distributed directly from the pole are shown in Fig. 1. Drive hooks should not be placed on the climbing side of the pole.

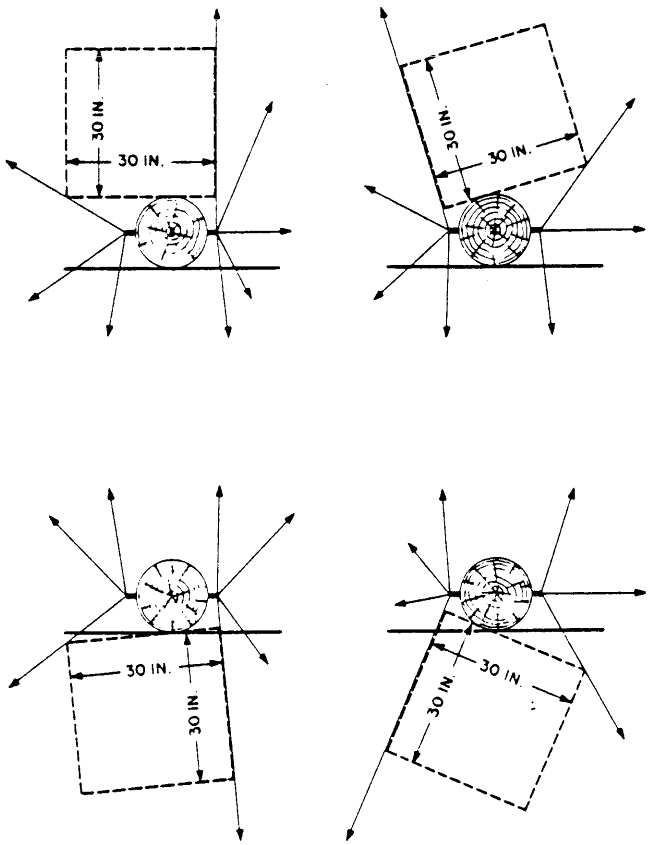


Fig. 1-Drop Wires Distributed from Pole

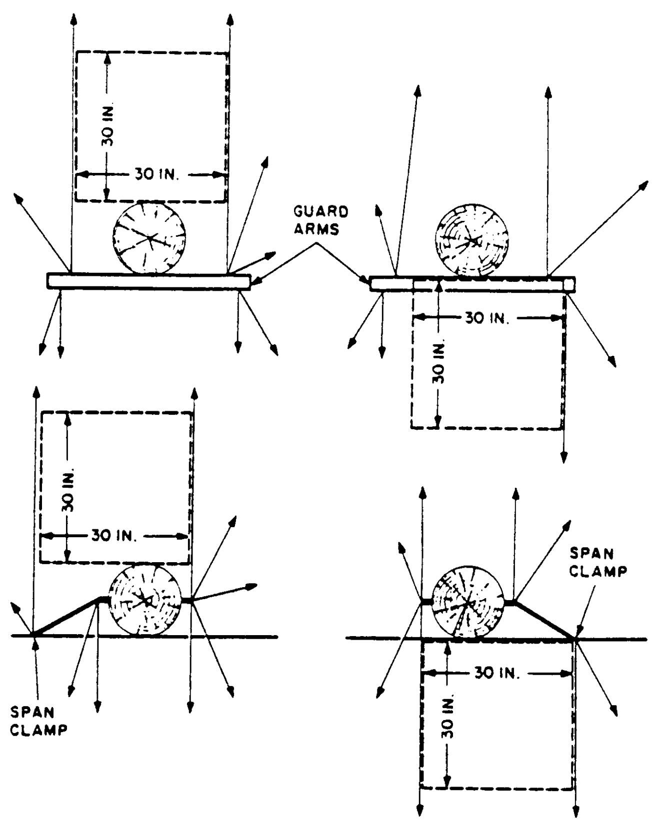


Fig. 2-Drop Wires Distributed From Guard Arm or Span Clamp

2.05 Where climbing space cannot be obtained because of drop wire attachments, if longitudinal cable is present, place span clamps on the strand and distribute from it. If longitudinal cable is not present and climbing space cannot be otherwise obtained, place a guard arm and distribute from it. See Fig. 2.

2.06 Full climbing space must be provided past longitudinal runs of cable, multiple line wire, drop wire, etc. Cable or multiple line wire, for example, may abut one or two sides of the 30-inch square but may not run through the climbing space.

2.07 On joint poles carrying only longitudinal power secondary conductors of 300 volts or less, the horizontal dimensions of climbing space may be reduced to 24 by 24 inches instead of the usual 30 by 30 inches. There is no reduction in the vertical requirement of 40 inches above and below telephone attachments.

2.08 On joint poles carrying only longitudinal power conductors of 750 volts or less and used to supply airport or airway marker lights, the width of climbing space across the line may be reduced to 16 inches. The width of climbing space along the line must be maintained at 30 inches.

2.09 On common crossing poles carrying only secondary conductors of 750 volts or less, the width of climbing space may also be reduced to 16 inches across the line. The width of climbing space along the line must be maintained at 30 inches. This applies without regard to whether the electric attachment is made by means of a pole-top extension or is made directly to the pole.

3. POLE AND GUARD ARM ATTACHMENTS

INSTALLING DRIVE HOOKS

3.01 Drive hook locations on the pole should be in accordance with Section 462-400-211 for making pole-to-pole and pole-to-building drop wire runs. Drive hooks must be located to provide the necessary clearances for climbing space, aboveground clearances, clearances from obstructions, and power clearances.

3.02 Stagger the hooks as shown in Fig. 3 when placing more than one drive hook on the same side of the pole. Try to obtain greater than the minimum vertical separation between the hooks, particularly for paralleling drop wires.

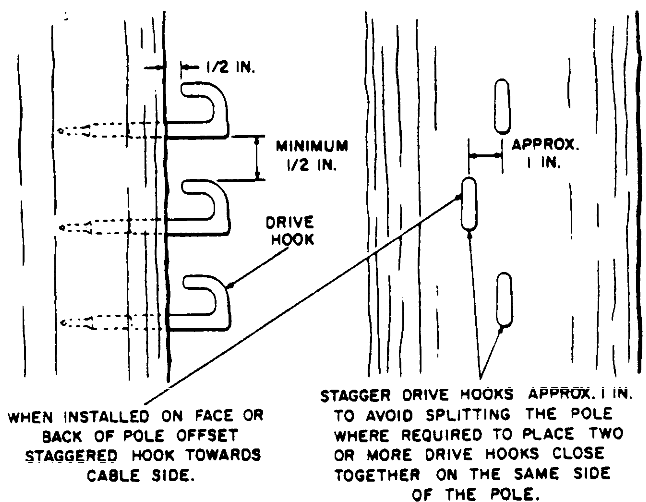


Fig. 3-Drive Hooks Installed in Pole

3.03 If the diameter of a pole is less than 5 inches, drill a 5/6-inch pilot hole approximately 3 inches deep for the drive hook to avoid splitting the pole. On such poles, provide a vertical clearance of about 3 inches between drive hooks installed on opposite sides of the pole. When a drive hook is to be installed 4 to 10 inches from the top of the pole, it will be necessary to provide a pilot hole to prevent splitting the top of the pole. A pilot hole should be drilled where difficulty is experienced in driving a hook into a hard pole.

CAPACITY OF DRIVE HOOKS

3.04 The maximum number of drop wires or spans of drop wire that may be attached to one drive hook varies according to the direction of the spans and the available space on the hook. (See Fig. 4 and Table A.)

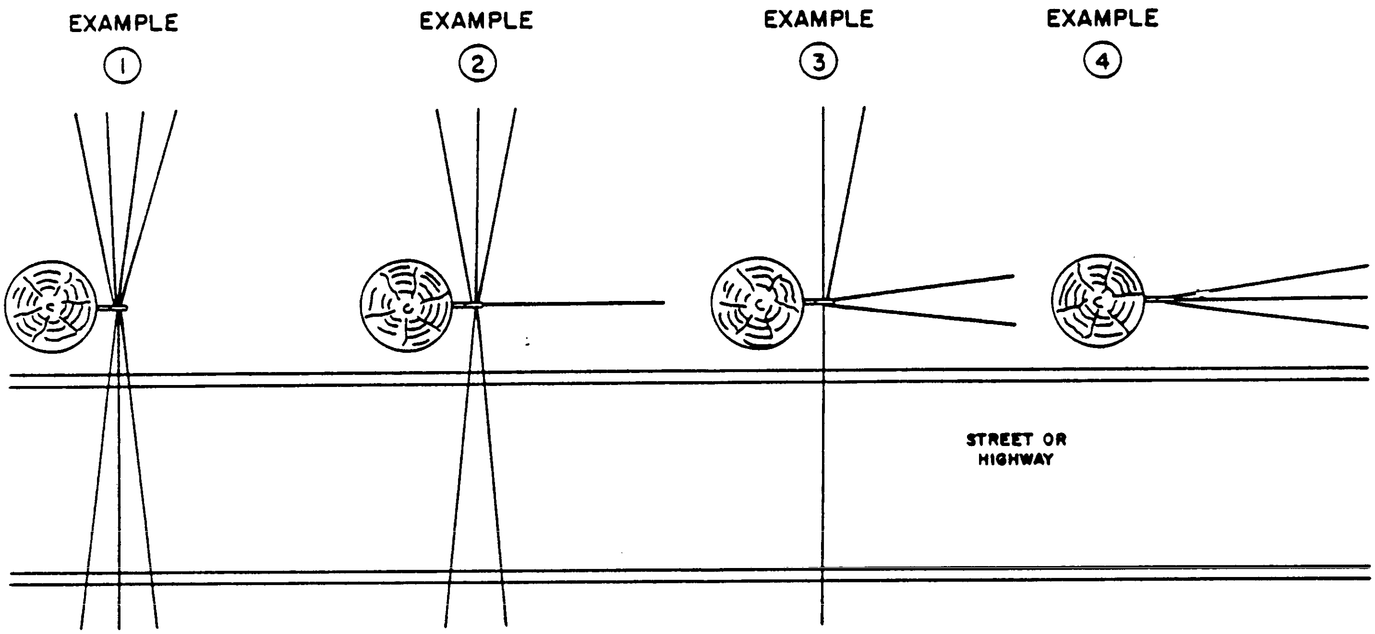


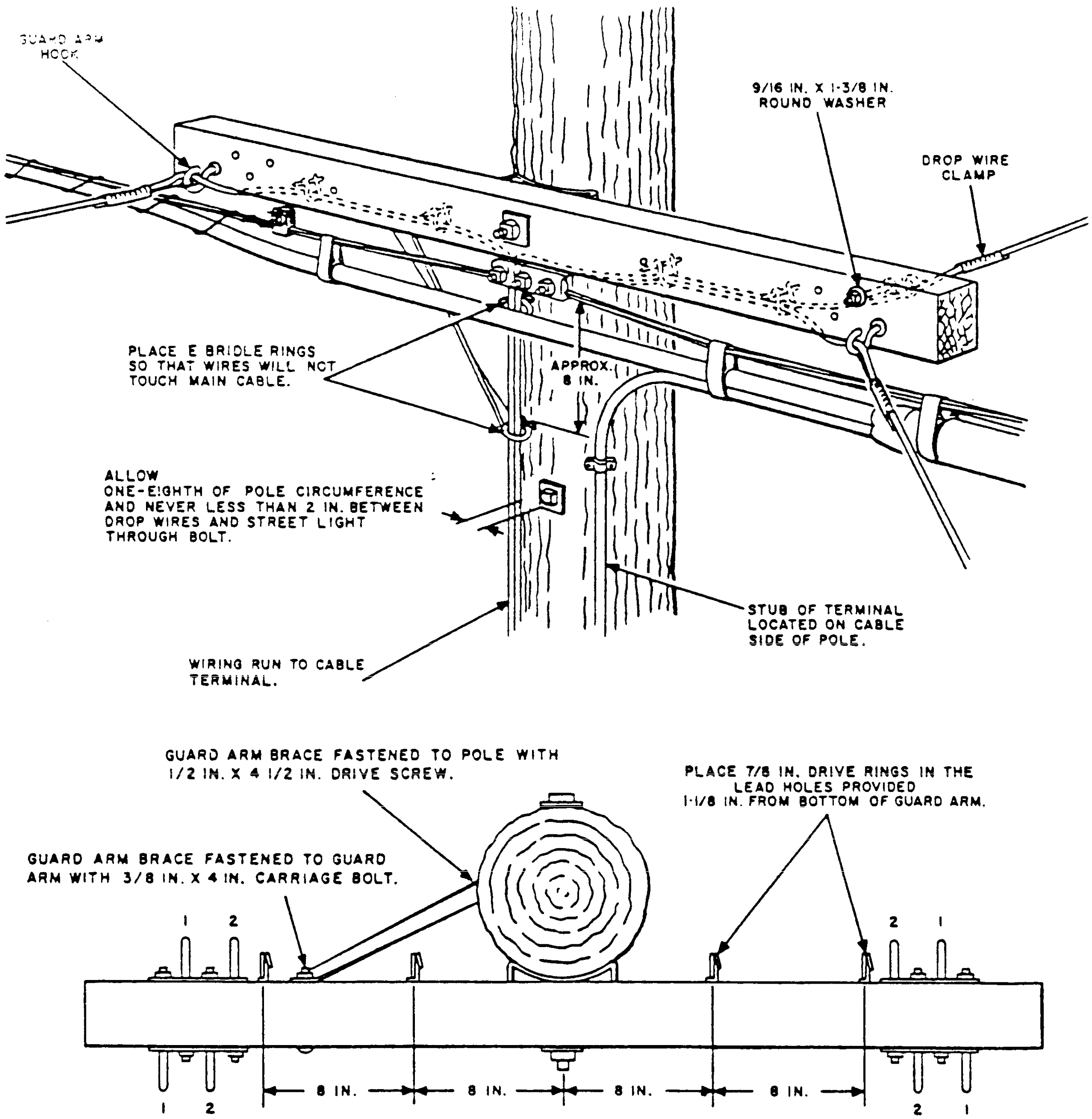
Fig. 4-Maximum Number of Spans Attached to One Drive Hook

TABLE A

MAXIMUM NUMBER OF SPANS (NOT WIRES) ALLOWED ON ONE DRIVE HOOK IN FACE OR BACK OF POLE				
EXAMPLE (SEE FIG. 4)	DIRECTION OF SPANS			TOTAL ALLOWABLE SPANS
	PARALLEL-ING POLE LINE	CROSSING HIGHWAY	NOT CROSSING HIGHWAY	
1	0	3	4	7
2	1	2	3	6
3	2	1	2	5
4	3	0	0	3

GUARD ARMS

3.05 A properly installed guard arm is shown in Fig. 5.



USE GUARD ARM HOOKS IN END HOLES FOR SUPPORTING WIRES RUNNING ALONG THE LEAD. THE PREFERABLE ORDER FOR PLACING THE GUARD ARM HOOKS IS INDICATED AS 1, 2.

Fig. 5-Guard Arm Installation

3.06 A metal pole gain installed as shown in Fig. 6 may be used to avoid the necessity of cutting a gain in the pole.

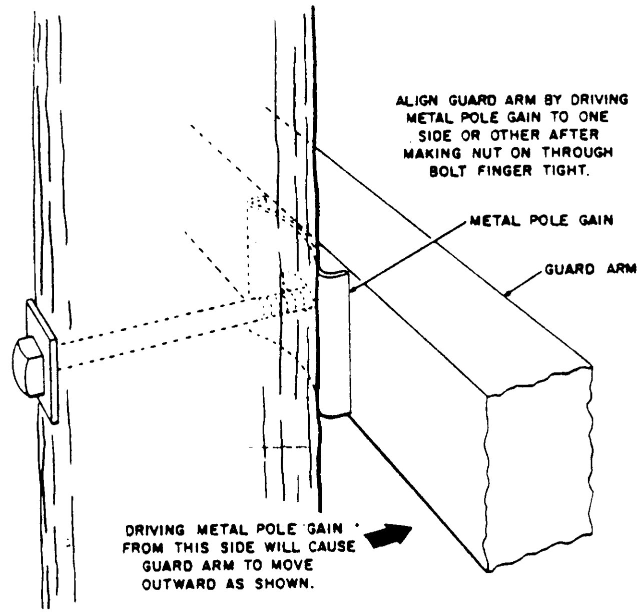


Fig. 6-Metal Pole Gain Installed

GUARD ARM HOOKS

3.07 Guard arm hooks are used to attach wires to guard arms and cross arms, other than the DE-type, when more than two drop wires must be attached to the same hook. On a guard arm, install the hooks in the holes provided at the ends of the guard arm (Fig. 7).

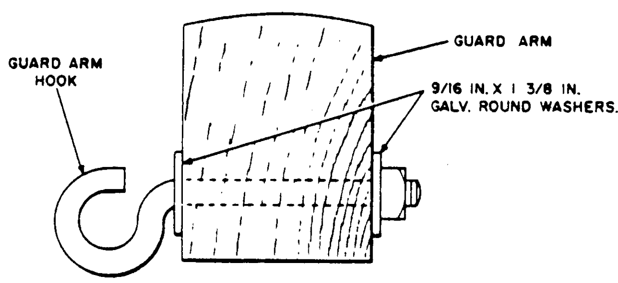


Fig. 7-Guard Arm Hook Installed

3.08 A total of five drop wires, pulling in any direction, may be attached to one guard arm hook.

3.09 When several drop wires are attached to one guard arm, it is desirable to distribute from both ends of the guard arm to equalize the load if the required climbing space will be maintained.

4. DROP WIRE CLAMPS

B DROP WIRE CLAMP

4.01 The component parts of the B drop wire clamp (Fig. 8) are made of aluminum alloy with corrosion-resistant steel wire loop on the wedge. This clamp is for general use except in highly corrosive areas.

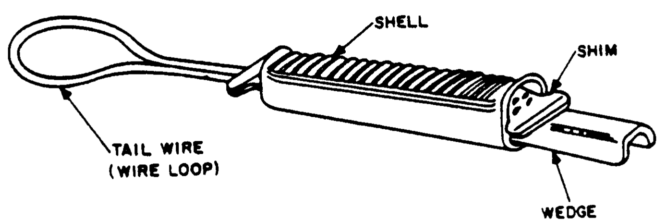


Fig. 8-B Drop Wire Clamp

G DROP WIRE CLAMP

4.02 The G drop wire clamp consists of a stainless steel wire bail integrally molded within a nylon wedge clamp (Fig. 9). A joining nylon member contains a corresponding mating wedge with serrations for gripping the drop wire. The G drop wire clamp can be used in corrosive and non-corrosive areas.

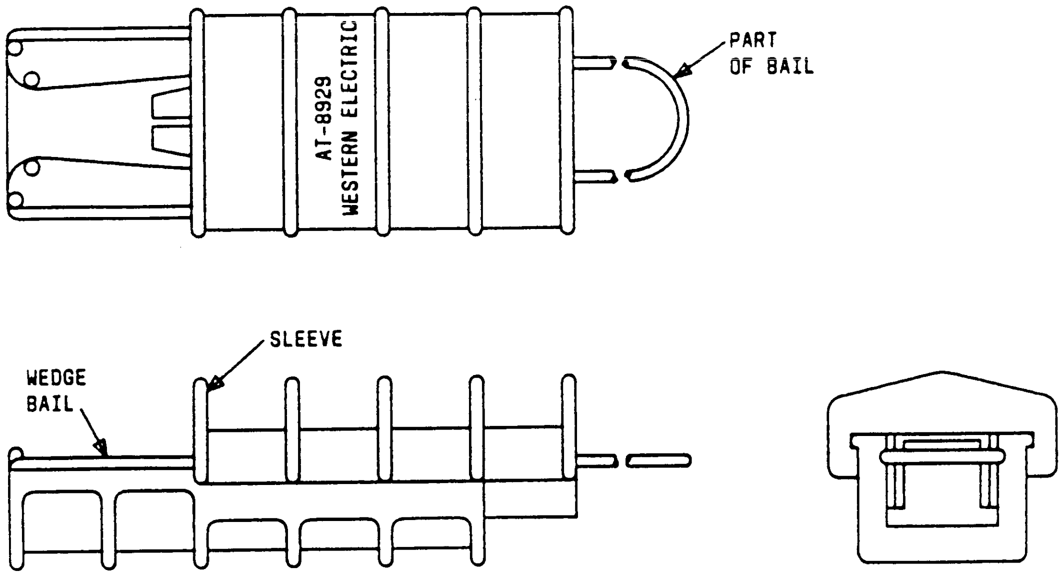


Fig. 9-G Drop Wire Clamp

INSTALLING DROP WIRE CLAMPS

4.03 Place the wire loop of the wedge on the drive hook as indicated in Fig. 10. Where the attachment is a knob, spread the wire loop sufficiently to permit its slipping over the knob and into the groove. Then pull on the wire loop and at the same time pinch the two sides together until the loop conforms to the diameter of the groove.

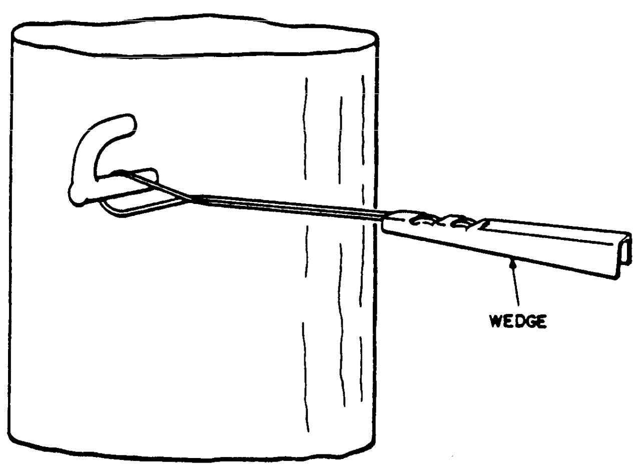


Fig. 10-Wire Loop on Drive Hook Loop

4.04 Place the shell of the clamp on the wire with the small end pointing toward the hook. With the wire lying flat in the shell, insert the shim with its rough side against the wire as shown in Fig. 11.

Note: When using twisted pair wire, untwist the wire for at least 8 inches at the clamp location and place the two conductors side by side in the shell.

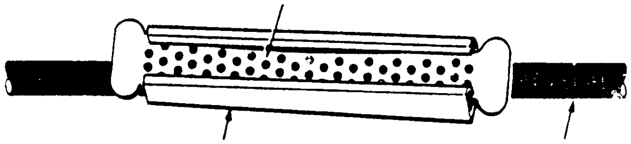


Fig. 11-Shim in Position in Shell

4.05 Slide the assembled shell and shim along the wire to a position where the wedge can be easily inserted into the large end of the shell. Insert the wedge into the shell and hold loosely assembled in one hand while pulling slack in or out of the drop wire through the clamp until the proper sag is obtained. (See Fig. 12). See Section 462-400-200 for stringing sags for drop wire.

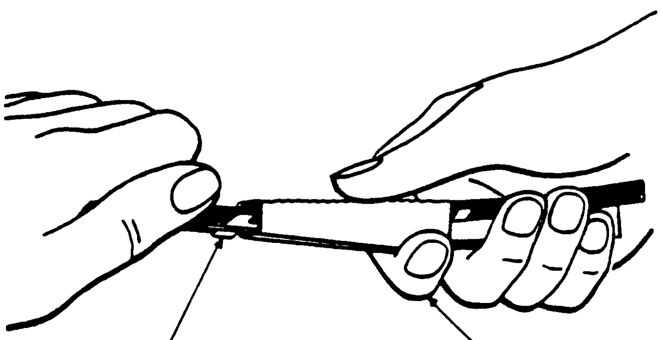


Fig. 12-Adjusting Sag in Drop Wire

4.06 Hold the drop wire at proper sag with one hand while sliding the shell and shim firmly over the wedge as shown in Fig. 13. Figure 14 illustrates the drop wire clamp installed on drive hook.

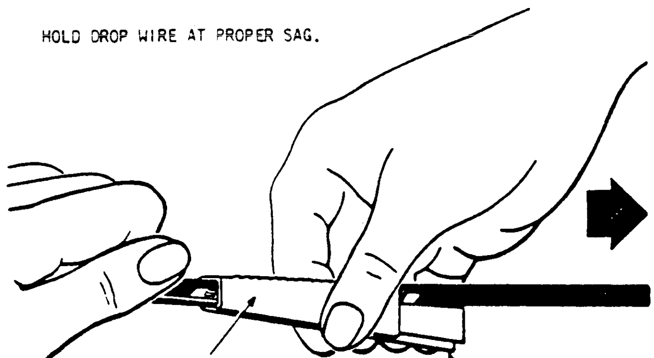


Fig. 13-Completing Installation of Clamp on Drop Wire

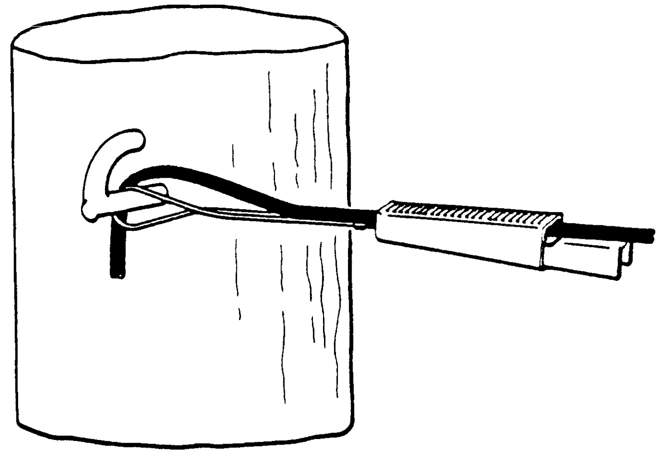


Fig. 14-Drop Wire Clamp Installed

5. TREE ATTACHMENTS

5.01 Tree attachments are a potential source of trouble and, therefore, are not desirable but are allowable under the following conditions, provided management has approved the installation:

- On private property where poles are not provided, tree attachments may be made to shorten the span from highway to building, provided installation can be made so that wires will have proper clearances.

- Where necessary to raise drop wire to clear tree limb or to obtain required clearance over trolley circuits or ground, and clearance cannot be obtained otherwise.

- Where lines pass through wooded areas.

5.02 Do not fasten attachments to tree limbs or trunks having diameters less than 3 inches. Fasten attachments to larger limbs because of the reduced movement of these limbs. Increase the drop wire sag a minimum of 12 inches more than the specified amount to allow for swaying of trees.

ATTACHING TO LIMBS OR TRUNKS OF TREES 6 INCHES OR MORE IN DIAMETER

5.03 Drive hooks may be used on limbs or trunks of trees having diameters of 6 inches or more. On straight runs or corners, attach the drop wire to the drive hook as shown in Fig. 15 and 16.

5.04 Not more than four drop wire clamps shall be attached to one drive hook, nor a total of three drop wire clamps in one direction for either condition shown in Fig. 15 and 16.

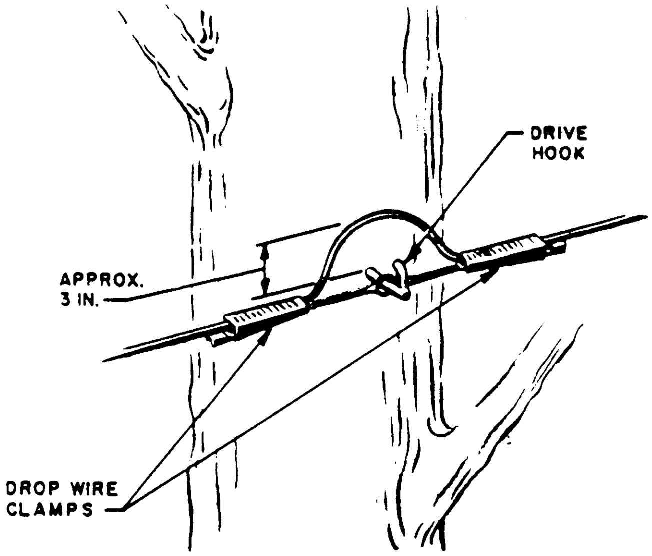


Fig. 15-Straight Run on Large Diameter Tree

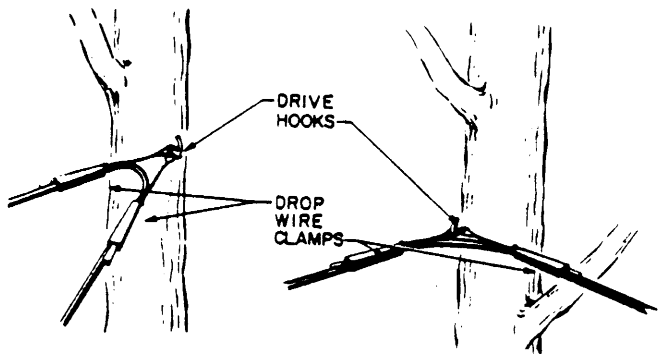


Fig. 16-Turning Corner on Large Diameter Trees

ATTACHING TO LIMBS OR TRUNKS OF TREES 3 TO 6 INCHES IN DIAMETER

5.05 Use S knobs when attaching drop wires to limbs or trunks of trees having diameters between 3 and 6 inches. Not more than one drop wire shall be attached to an S knob. On straight runs or corners, attach the drop wire to the S knob as shown in Fig. 17 and 18.

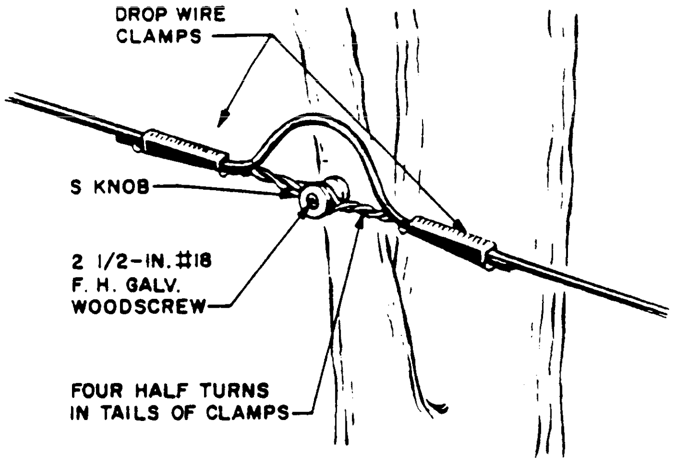


Fig. 17-Straight Run on Small Diameter Tree

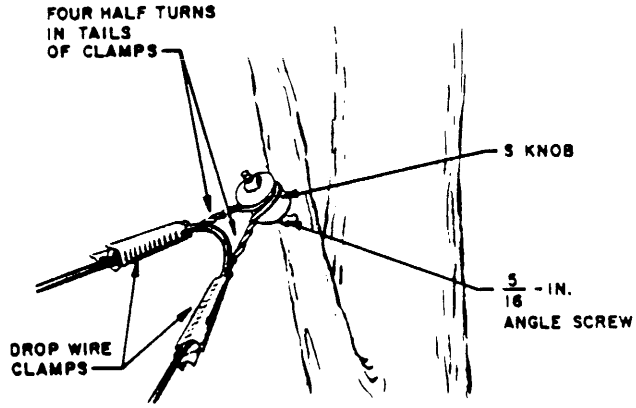


Fig. 18-Turning Corner on Small Diameter Tree

MECHANICAL PROTECTION OF DROP WIRES

5.06 When it is necessary to protect drop wires against abrasion from tree limbs or obstructions such as garages, guys, signs etc, use a P or C Wire Guard. (Section 462-400-100)

5.07 Use the C Wire Guard when protecting multiple drop wire from abrasions.

5.08 When protection is necessary for single pair drop wire, use the P Wire Guard.

5.09 Install wire guards as shown in Fig. 19.

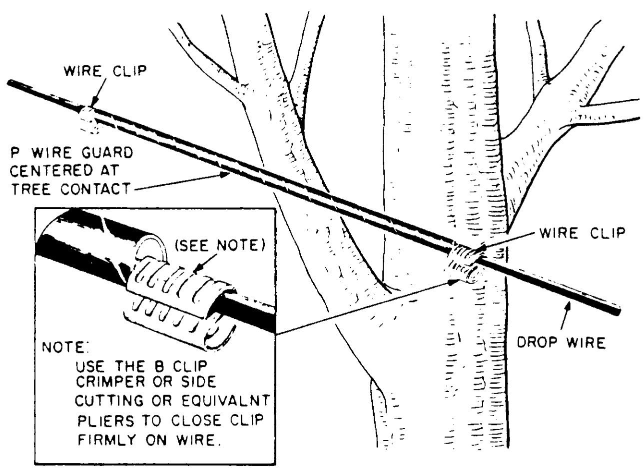


Fig. 19-Wire Guard Installed

PARTY LINE BRIDGES AT TREE ATTACHMENTS

5.10 Make party line bridges at tree attachments as shown in Fig. 20. Attach the 400-2000A wire terminal to the tree with two 2-inch No. 10 round head galvanized wood screws. See Section 462-240-900 for the installation of the 400-2000A wire terminal.

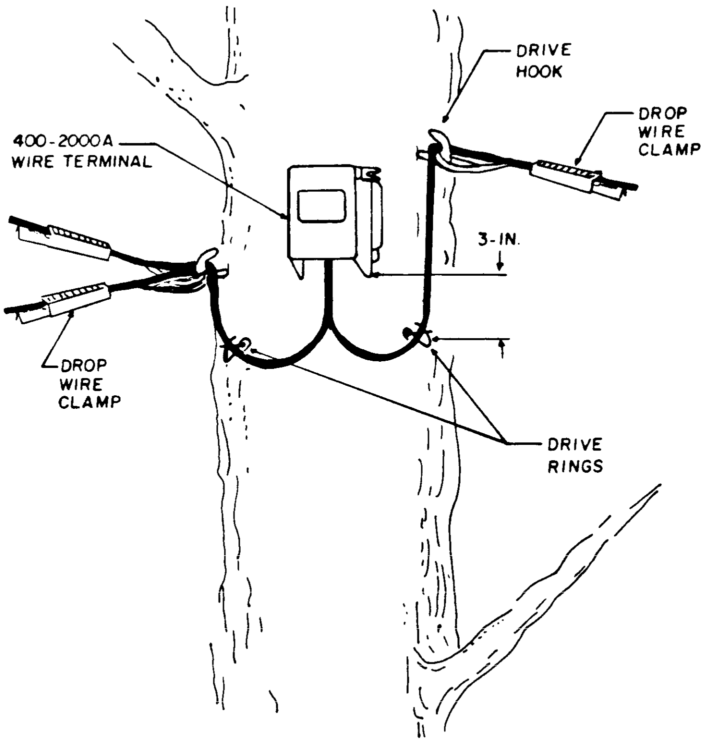


Fig. 20-Party Line Bridge

6. SPAN CLAMPS

6.01 Span clamps should be used only when it is impractical to attach the customer's drop directly from a pole. Some of the conditions which will necessitate the use of a span clamp are:

(a) Right-of-way difficulty in crossing private property.

(b) To avoid trees, clothes lines, and other obstructions.

(c) Where guard arms would otherwise be necessary to provide pole climbing space.

(d) Where a number of attachments to a masonry building can be avoided.

DANGER: When removing or relocating E span clamps, place the ladder on the opposite side of the building span. This eliminates placing tension on the drop wire and prevents a "sling-shot" effect when the drop wire is removed and tension is released.

INSTALLING E SPAN CLAMP

6.02 The E span clamp is designed to be used on galvanized suspension strand and jacketed strand. The E span-clamp (Fig. 21) is placed on suspension strand as follows:

NOTE: The precautions covered in Section 627-295-500 must be observed when a span clamp is to be placed from a ladder or other strand supported device.

Fig. 21-E Span Clamp

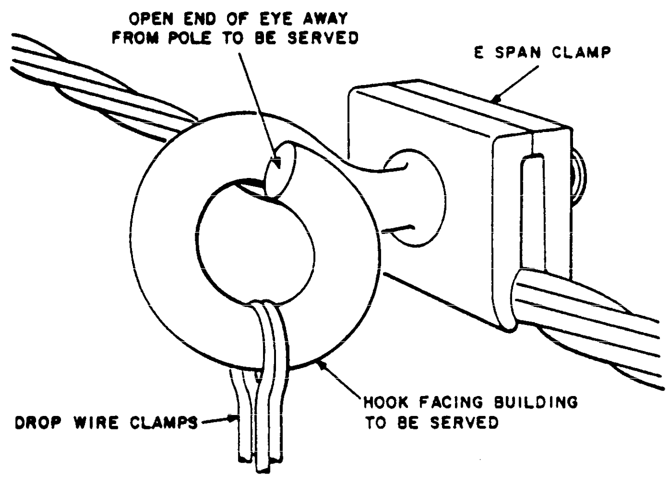


Fig. 22-E Span Clamp Mounted on Strand

(1) Place the clamp on the strand so the hook will be in a vertical position facing the building to be served and the open eye of the hook will face away from the pole to which the drop wire will be attached (Fig. 22).

(2) On lashed cables, position the span clamp between adjacent wraps of lashing wire so the wire will not be under the jaws of the clamp.

(3) On lashed lead sheath cables, place a B cable guard on the cable beneath the span clamp to protect the sheath from damage that may be caused by the jaws of the clamp.

(4) Securely tighten the span clamp nut to the strand.

Note: The possibility that the drop wire clamp will become detached from the span clamp is eliminated by placing the span clamp so the open eye of the clamp is away from the pole to which the drop is running.

6.03 Where the span clamps are placed on 2.2M suspension strand, it will be necessary to place a serving of 0.045 lashing wire on the strand before installing the clamp. The wraps should be spaced about 1/4 inch apart and cover about a 3-inch length of strand. After the clamp is tightened, cut off the excess length of wire serving which falls outside the ends of the clamp.

Note: The jaws on the E span clamp are shaped to accommodate jacketed strand. This eliminates the necessity of removing a portion of the jacket from self-supporting cable strand when installing the clamp.

RUNNING DROP WIRE FROM SPAN CLAMP TO POLE

6.04 Do not place more that two drop wires on the span clamp.

6.05 The following procedure should be used to obtain maximum separation between the drop wire and cable (Fig. 23):

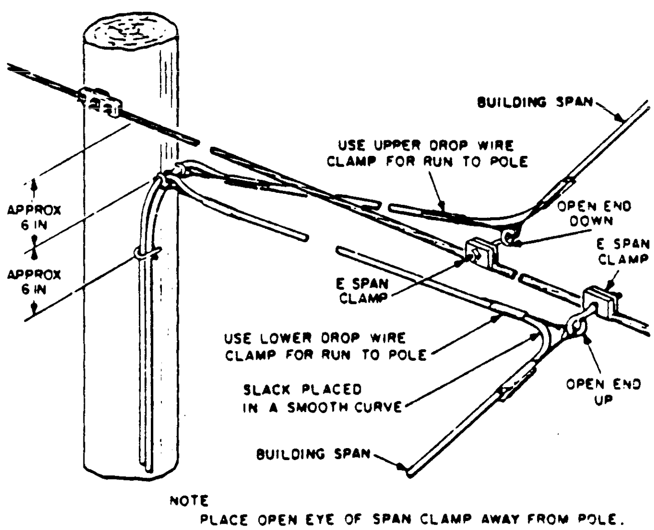


Fig. 23-Spans to Drive Hooks on Pole

(a) If the open end of the span clamp hook is pointing upward, use the upper drop wire clamp to support the pole span, and the lower clamp to support the building span.

(b) If the open end of the span clamp hook is pointing downward, use the upper drop wire clamp to support the building span, and the lower clamp to support the pole span.

INSTALLING F SPAN CLAMP

6.06 The F span clamp, illustrated in Fig. 24, is an aluminum clamp that is shaped at one end to grip the suspension strand. A galvanized steel hook for attaching and supporting drop wire clamps is located at the other end. The lower side of the clamp is moved by the beveled portion of the clamp screw when rotated in a clockwise direction. The forward motion of the lower clamp side forces the strand against the curved upper clamp side locking the clamp securely on the strand. The clamp screw is turned by the B clamp wrench blocked into the handle of a standard tree pruner section.

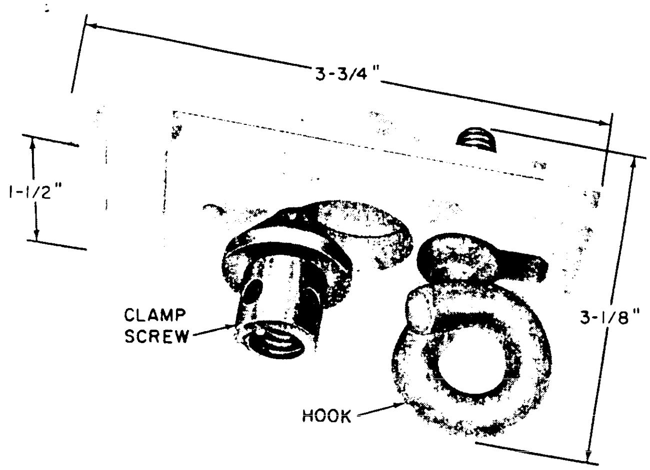


Fig. 24-F Span Clamp

6.07 The F span clamp is used for attaching drop wire clamps to suspension strand from the ground at locations where existing conditions such as steep or rocky terrain, heavy trees or shrubbery, enclosed rear lots and fencing make the use of ladders impractical or potentially hazardous. The F span clamp may be used on 6M or 10M galvanized strand and 6M, 10M, or 16M CR strand. It may also be used on the jacketed 6.6M suspension strand of self-supporting cable without removing any portion of the jacket. The F span clamp should not be used on 16M or 25M galvanized strand because of strand diameter.

Note: Do not use the F span clamp on installations where the subscriber's premises are located on the opposite side of a roadway from the distribution cable.

6.08 The F span clamp is installed with a B clamp wrench (Fig. 25). The B clamp wrench consists of a machined and threaded steel rod that is locked and pinned in an aluminum body. The threaded end of the steel rod screws into the clamp screw of the F span clamp. The body of the wrench fits into the end of a tree pruner handle section and the recessed hold at the base is used for locking the wrench in the pruner section.

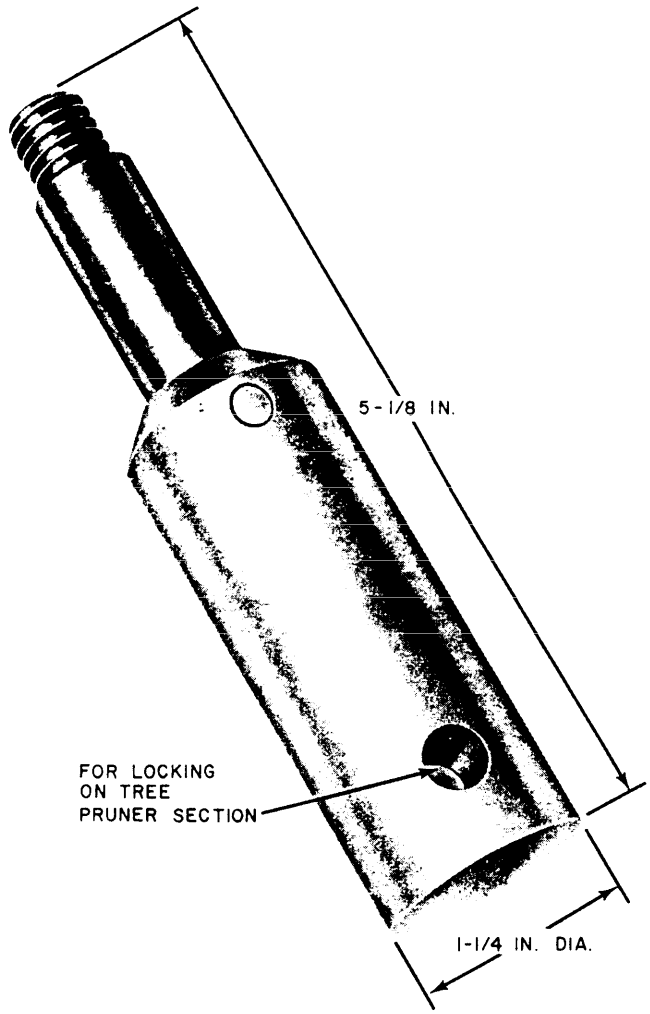


Fig. 25-B Clamp Wrench

6.09 Contrary to normal practices, the procedure for placing drop wire with the F span clamp requires that the suspension strand attachment must be completed first. For this reason, the F span clamp is not recommended for use when the subscriber's premises are located on the opposite side of the street from the distribution cable. The danger in such cases is that vehicular traffic may be obscured from the craft person's vision during building attachment operations. Figure 26 shows the relative positions of the pole, F span clamp, and the building attachments.

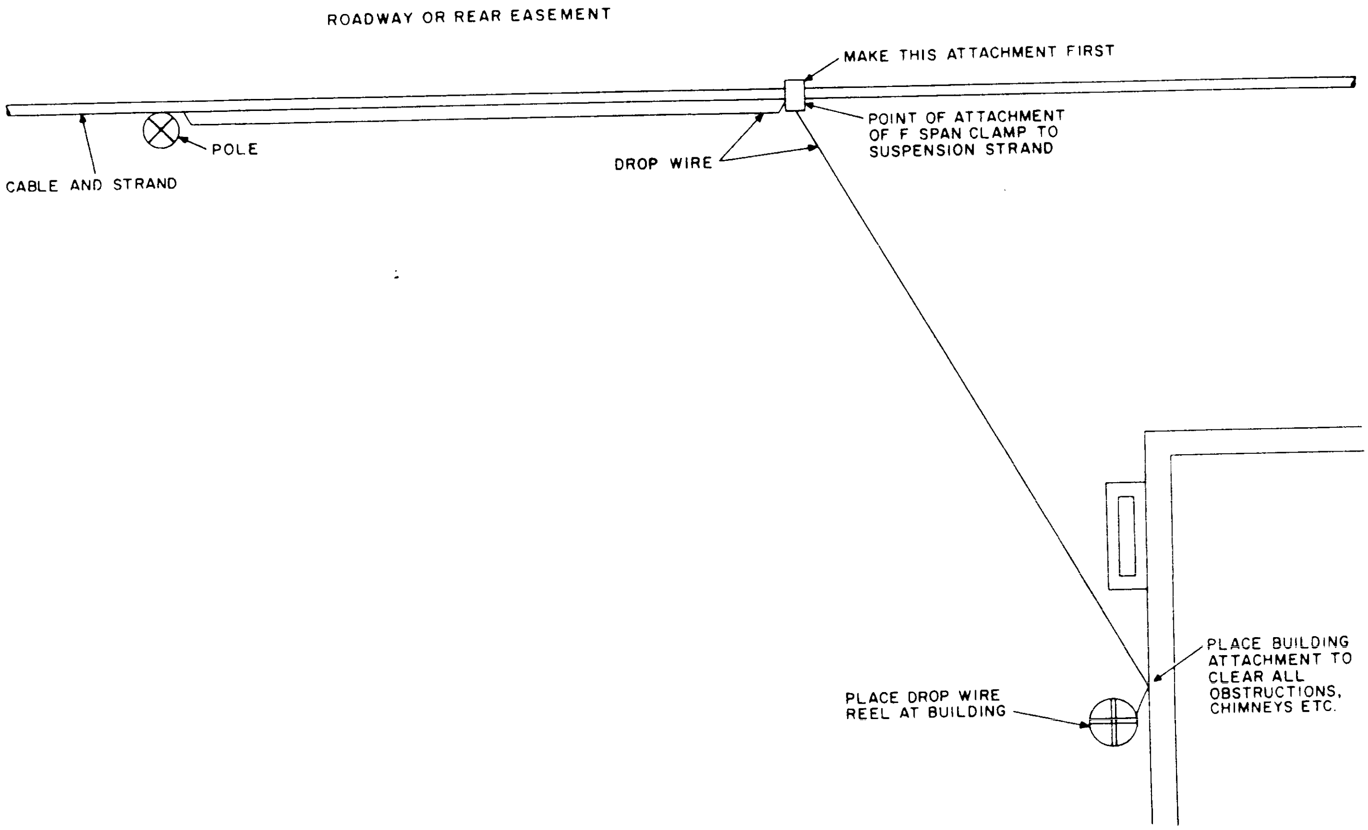


Fig. 26-Relative Positions of Pole, Building, and F Span Clamp

6.10 To install an F span clamp on suspension strand, proceed as follows:

(1) Determine the location of the F span clamp on the strand and the drop wire building attachment to avoid obstructions such as chimneys, etc.

(2) Place the building attachment hardware for supporting the drop wire as described in Section 462-350-213. Place the drop wire reel near the attachment location.

(3) Unroll sufficient drop wire to reach the span clamp location and the cable distribution terminal at the pole.

(4) Make certain the F span clamp is open as wide as possible. Back off the beveled clamp screw, if necessary. Screw the B clamp wrench into the clamp screw of the span clamp until the shoulder of the wrench rests against the rim of the clamp screw. Insert the base of the B clamp wrench in the top of the tree pruner handle and lock the wrench securely in place (Fig. 27).

(5) Install the two drop wire clamps on the drop wire directly below the proposed span clamp location on the strand. Leave a 6-inch loop between the drop wire clamps (Fig. 28). Place the drop wire clamp assemblies on the hook of the F span clamp. The drop wire clamp toward the building attachment should be placed last to prevent accidental disengagement of the other clamp.

(6) Using enough tree pruner handle sections to reach the strand, raise the span clamp and drop wire assembly to the suspension strand allowing the drop wire to pass through the hands as shown in Fig. 28.

(7) Rest the F span clamp on the strand. Walk forward slowly until the opening of the F span clamp engages the strand. Make certain the strand is still engaged and slowly rotate the tree pruner handles to lock the span clamp on the suspension strand. Tighten the F span clamp securely.

WARNING: To eliminate possible damage to the lashing wire, avoid locating the clamp at the point where the lashing wire passes over the strand.

(8) Disengage the B clamp wrench from the span clamp assembly by providing a sharp reverse twisting motion on the tree pruner handle to unseat the wrench. Once loosened, unscrew the wrench completely from the clamp screw, leaving the span clamp installed on the strand as illustrated in Fig. 29.

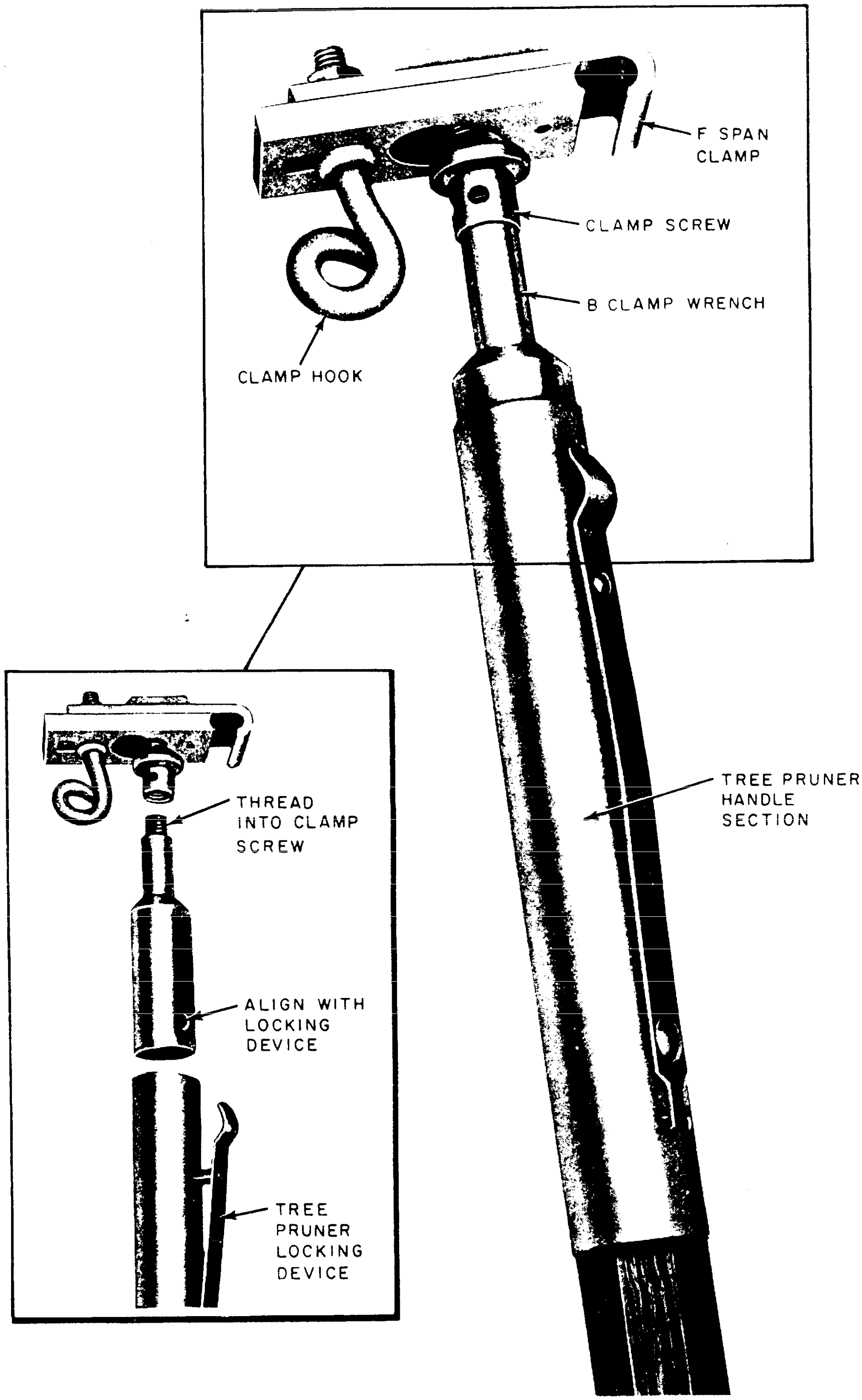


Fig. 27-Clamp and Wrench Attached to Tree Pruner Handle

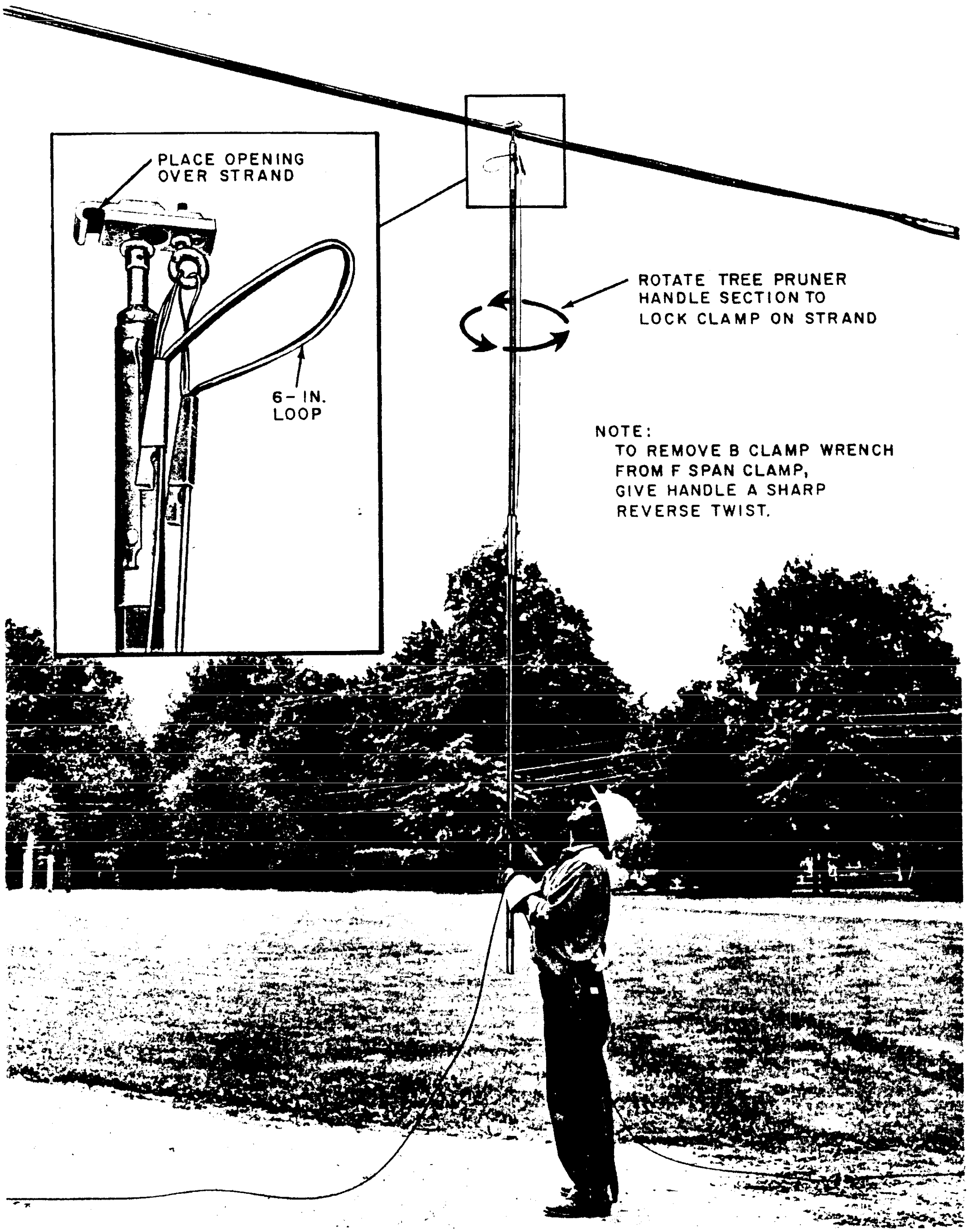


Fig. 28-Installing Span Clamp on Strand

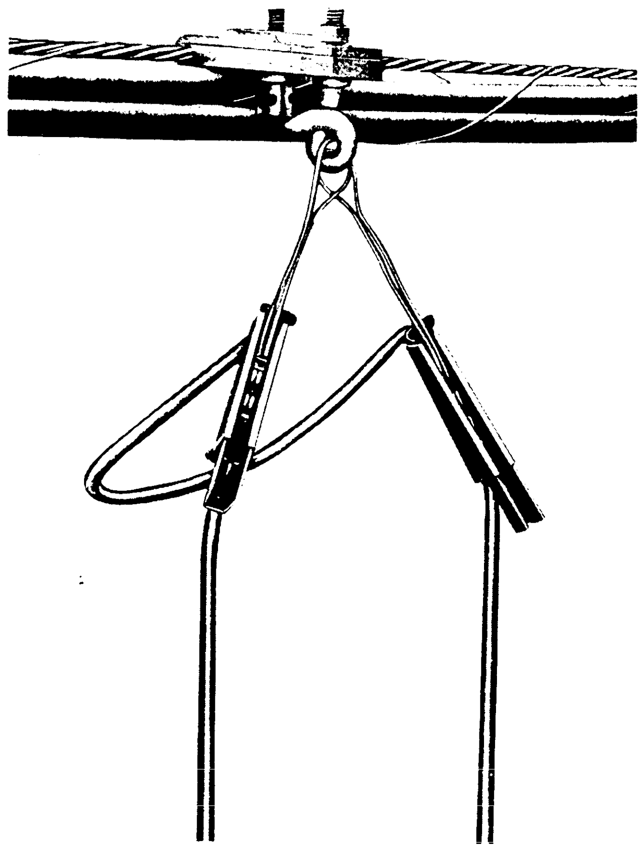


Fig. 29-F Span Clamp Installed on Strand

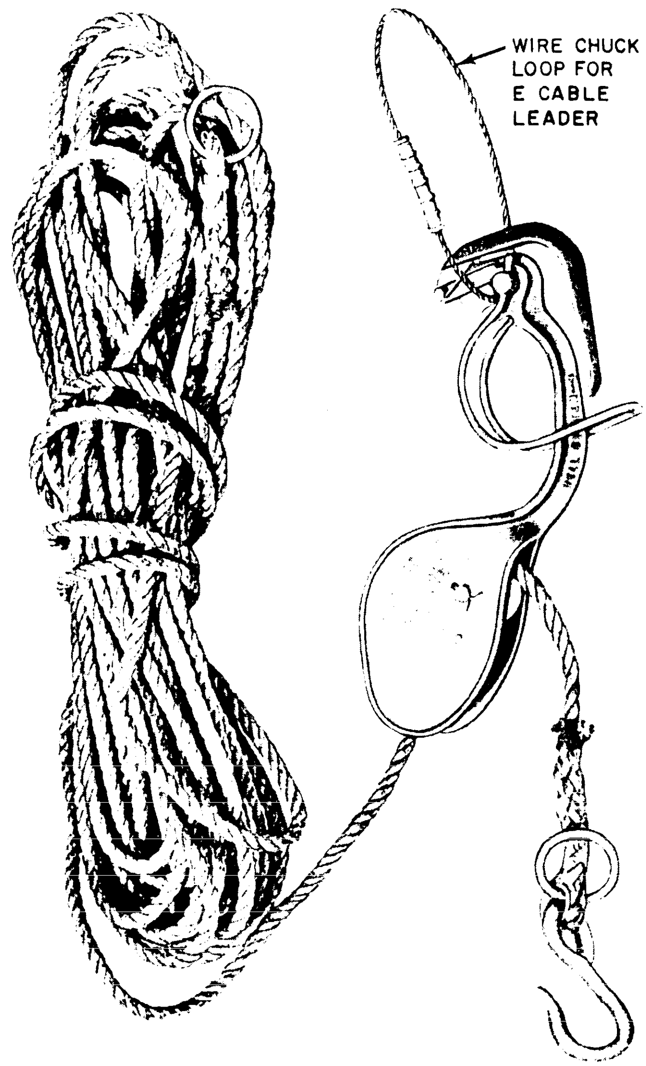


Fig. 30-B Aerial Handline

(9) After completion of the mid-span clamp attachment, raise the drop wire to the building attachment by means of a B aerial handline equipped with a wire chuck loop (Fig. 30). Hang the B aerial handline on the previously placed building attachment by the wire chuck loop. Remove the drop wire slack between the building and span clamp, and add drag on the drop wire reel. Place a temporary drop wire clamp on the drop wire at an extended arms distance from the building as shown in Fig. 31. Pull the drop wire into position at the building attachment from the ground with the aerial handline as illustrated in Fig. 32. Proceed carefully to ensure that the drop wire is clear of all objects or pedestrians when raising the wire to the building attachment.

Fig. 31-Locating Temporary Drop Wire Clamp

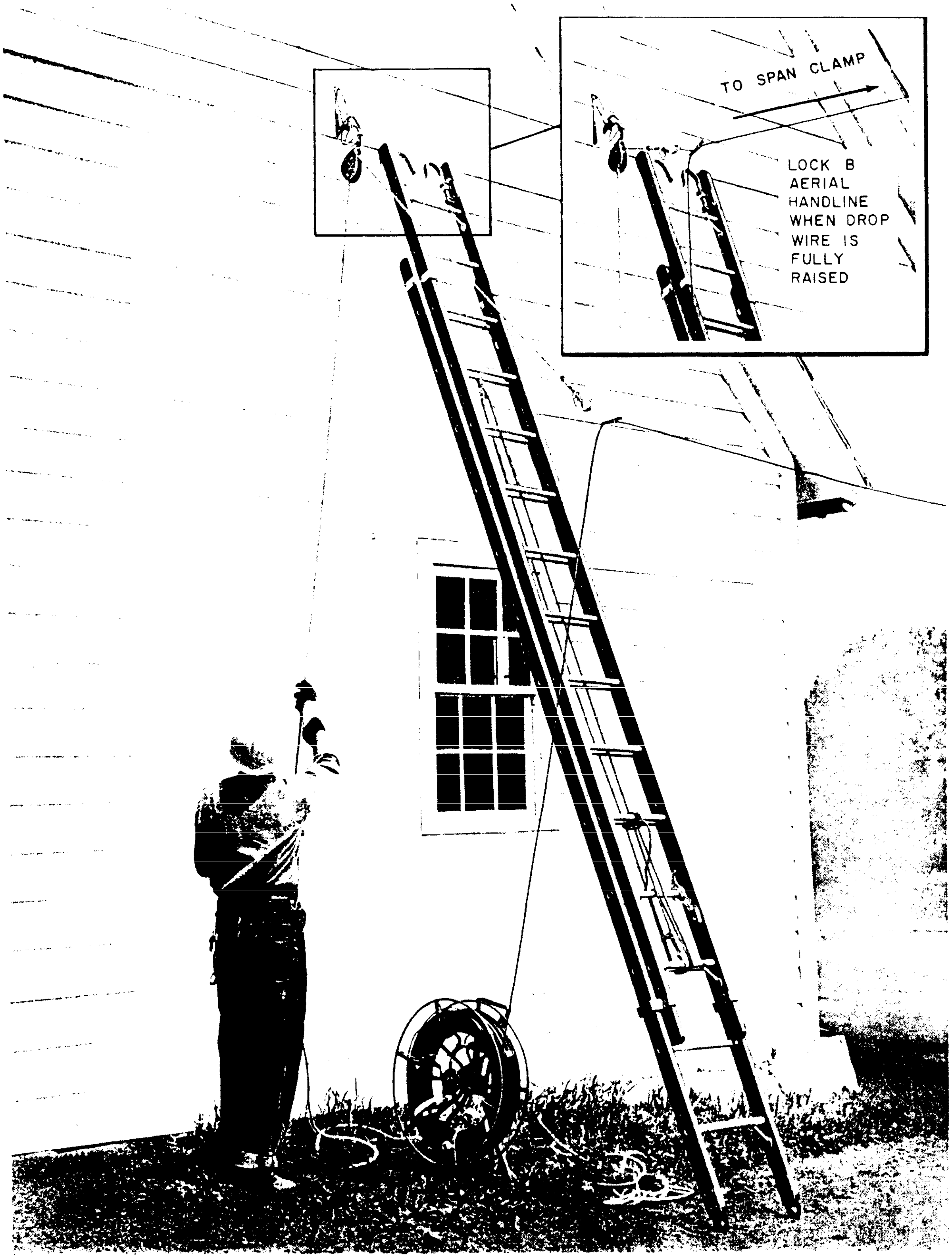


Fig. 32-Raising Drop Wire to Building Attachment

(10) When the drop wire is raised to its approximate final stringing sag (see Section 462-400-200), move the rope of the B aerial handline in a lateral motion to activate the automatic locking device on the handline to hold the drop wire in the raised position. The craft person may then ascend the ladder to make the permanent building attachment. Install the permanent drop wire clamp on the drop wire and the building attachment as shown in Fig. 33.

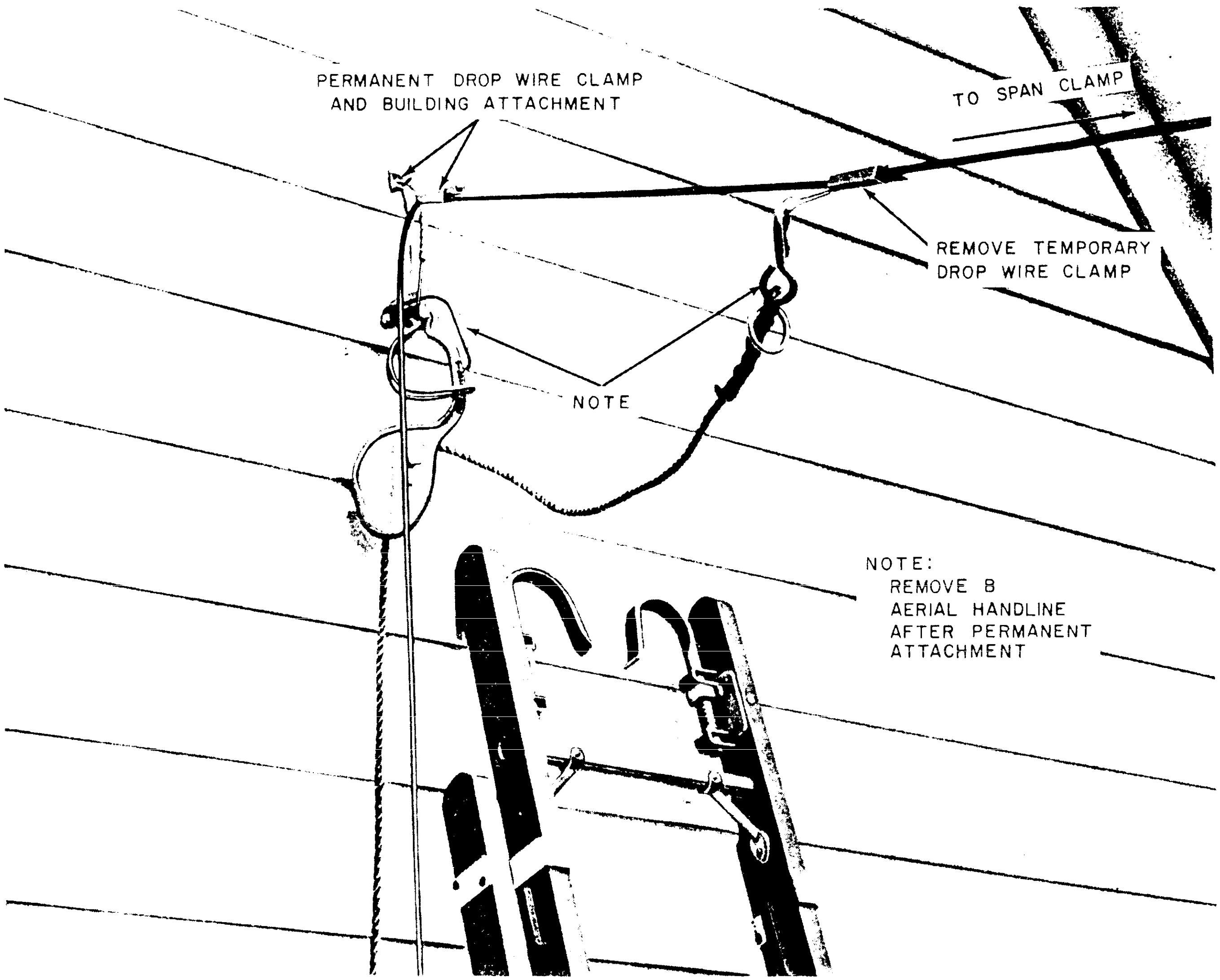


Fig. 33-Completing Permanent Building Attachment

(11) Remove the B aerial handline from the building attachment and remove the temporarily installed drop wire clamp from the tensioned drop wire to complete the building attachment.

(12) Complete all other pole and building attachments and terminate the drop wire as described in other Sections of the 462 Division. Figure 34 illustrates the completed mid-span clamp attachment. Note the position of the drop wire clamp toward the building. This ensures against accidental disengagement of the drop wire clamp supporting the drop wire toward the pole. Limit F span clamp attachments to two drop wires.

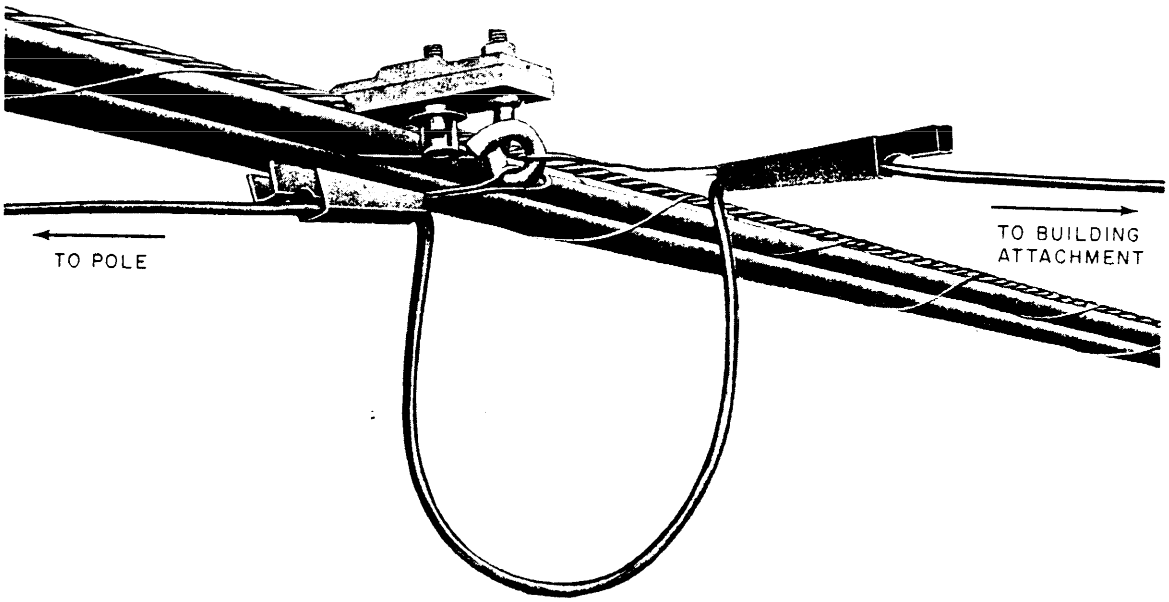


Fig. 34-Completed F Span Clamp Installation

REMOVING F SPAN CLAMP

6.11 To remove an F span clamp, first remove the building and pole attachments. Then a ladder must be placed against the cable suspension strand or an aerial lift trunk used. The C screwdriver is placed through the radial holes of the clamp screw. The clamp is then removed by backing off the clamp screw.