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IEEE Guide on Terminology for Tools and Equipment to Be Used in Live Line Working

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of the
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Foreword

(This Foreword is not a part of ANSI/IEEE Std 935-1989, IEEE Guide on Terminology for Tools and Equipment to Be Used in Live Line Working.)

This standard has been prepared by IEC Technical Committee No. 78: Tools for Live Line Working.

A first draft of this document was discussed during the inaugural meeting of this Technical Committee held in Paris in 1976.

Drafts were discussed at the meetings held in Stockholm in 1978, in Budapest in 1979, and in Philadelphia in 1980. As a result of the latter meeting, a draft, Document 78 (Central Office) 4, was submitted to the National Committees for approval under the Six Months' Rule in February, 1980.

Amendments, Document 78 (Central Office) 7, were submitted to the National Committees under the Two Months' Procedure for approval in April, 1981.

The National Committees of the following countries voted explicitly in favor of publication:

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The advisory group to the US National Committee of IEC Technical Committee No. 78 is the Engineering in the Safety, Maintenance, and Operation of Lines (ESMOL) Subcommittee of the Transmission and Distribution Committee, IEEE Power Engineering Society. Members of the Working Group on Definitions, Standards, Bibliography, and Terminology of the ESMOL Subcommittee were the following:

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IEEE Guide on Terminology for Tools and Equipment to Be Used in Live Line Working

1. Introduction

1.1 Scope

This standard applies to terminology for tools and equipment used in live line working. This standard is not intended to be a dictionary giving detailed definitions of all the terms used in live line working, but only the necessary details, without indications of their components and their methods of use, to permit identification of the tools and equipment and to standardize their names.

Terms used in this guide represent the terms normally used in North America. English terms in the IEC Publication 743 (1983), Terminology for Tools and Equipment to Be Used in Live Working, will typically use the word *pole* instead of *stick* and *tenon* instead of *tongue*. It should also be noted that there are other tools available and presently in use that are not shown in this guide.

1.2 General Terms

1.2.1 Difference between Insulated and Insulating Tools

1.2.1.1 Insulated Tool

A tool made of conductive material and fully or partly covered by insulating material.

1.2.1.2 Insulating Tool

A tool essentially made of insulating material.

1.2.2 Insulating Tool Components

1.2.2.1 End Fitting

Part (generally metallic) permanently fitted to the ends of insulating tube or rod.

1.2.2.2 Foam

An insulating material composed of closed polyurethane cells. Its purpose is to prevent the ingress and migration of moisture.

1.2.2.3 Rod

Solid rod composed of synthetic insulating material, normally reinforced.

1.2.2.4 Tube

Composed of synthetic insulating material, normally reinforced, the interior of which may be filled or hollow.

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1.2.3 Types of Tools and Insulating Assemblies

1.2.3.1 Auxiliary Arm Assembly

Support tools arranged to form an auxiliary arm, to lift conductors off their insulators.

1.2.3.2 Hand Stick

Used to operate on network components at a distance. It is subjected only to the loads imposed by the worker.

Examples:

1) universal hand stick
2) wire cutting stick

1.2.3.3 Insulating or Insulated Hand Tools

Constructed of insulating material or of conductive material (e.g., metal) primarily for mechanical strength, and then coated or covered with insulating material to protect the worker from electrical contact and to avoid flashovers.

1.2.3.4 Mast Assembly

Various support sticks and tools arranged in a swivel-boom-type configuration assembled in place on a structure that, for example, may be used to

1) lift a string of insulators out of their position to facilitate changing damaged units;
2) lift conductors off their insulators.

1.2.3.5 Support Stick

Used to hold or move conductors and equipment.

Examples:

1) tension stick
2) suspension link stick
3) conductor support stick
4) swivel boom

1.2.3.6 Trolley Roll Layout

Various support tools assembled with support sticks, saddles, trolley wheels, pole-clamps, and insulator forks.

1.2.3.7 Working Stick

Consists of insulating tube and/or rod with end fittings.

The two types are

1) hand stick
2) support stick

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1.2.4 Tools and Accessories

Tools and accessories that can be attached to the end fitting of universal sticks and that are used to perform various operations.

1.2.5 Protective Covers

Generally made of insulating materials, they are used to cover live or non-energized elements in order to avoid accidental contact.

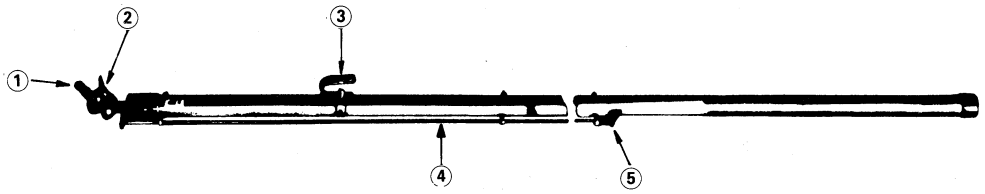
They may be rigid or flexible and either shaped or in sheets.

2. Insulating Sticks

2.1 Hand Sticks

2.1.1 All-Angle Cog Wrench

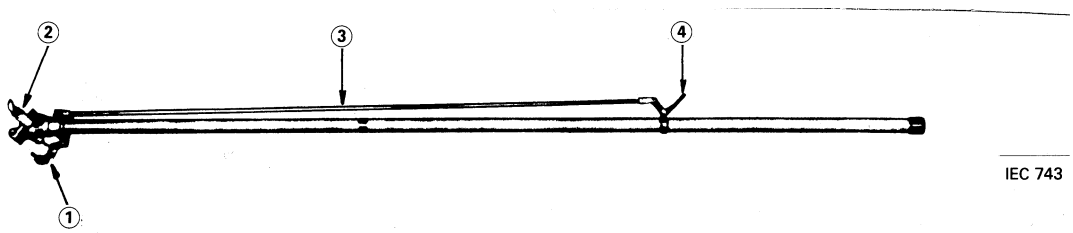
Used with removable sockets to install and remove bolts and nuts.



① Head
② Gear
③ Hanger hook
④ Control rod
⑤ Operating handle

2.1.2 Clip-on Ammeter Stick

A tool to which a clip-on ammeter is attached.



① Operating pin
② Ammeter clamp
③ Control rod
④ Operating lever

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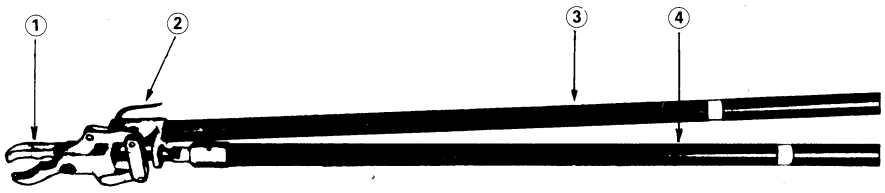
2.1.3 Cotter Key Plier Stick

Used to grip, hold in place, or remove various small pieces.



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1 Jaw
2 Hanger hook
3 Support handle
4 Operating handle

2.1.4 Flexible Insulated Wrench

Used with removable sockets to hold, install, and remove bolts and nuts.



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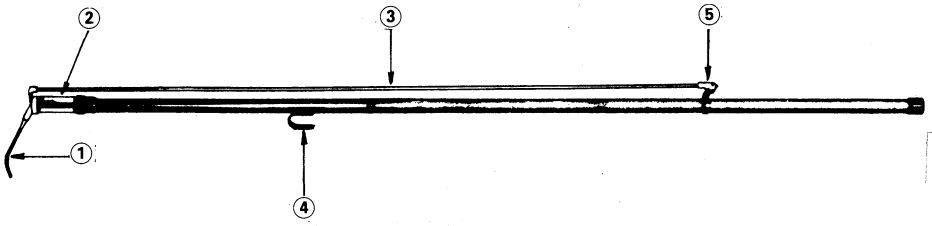
1 Flexible socket wrench head
2 Universal splined-head

2.1.5 Insulating Oiler Stick

Used to apply a lubricant or rust penetrant.



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1 Spout
2 Oil reservoir
3 Control rod
4 Hanger hook
5 Operating handle

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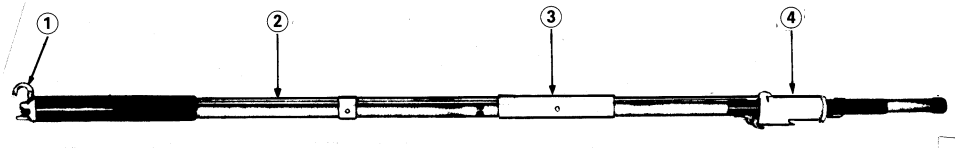
2.1.6 Retractable Hook Stick

Used to install, remove, or handle live-line clamps and various accessories equipped with an eye.



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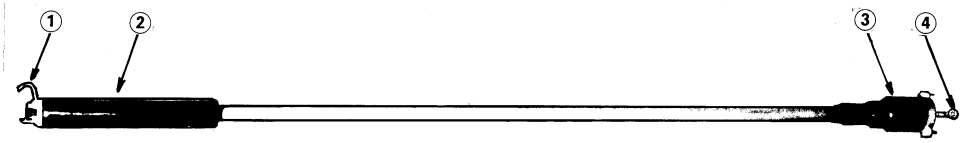
1 Hook
2 Operating rod
3 Hand position sleeve
4 Sliding hand grip

2.1.7 Retractable Hook Stick Extension

Attached to the retractable hook stick to provide a longer reach.



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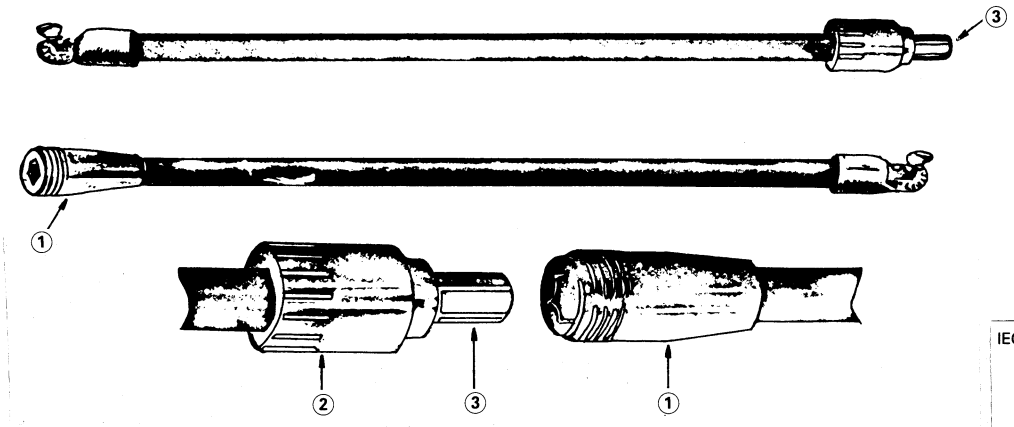
1 Engaging hook
2 Protective sleeve
3 Socket
4 Eye

2.1.8 Spliced Universal Hand Stick

Made of one or more elements spliced together.



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1 Male splice
2 Female splice
3 Tenon (tongue)

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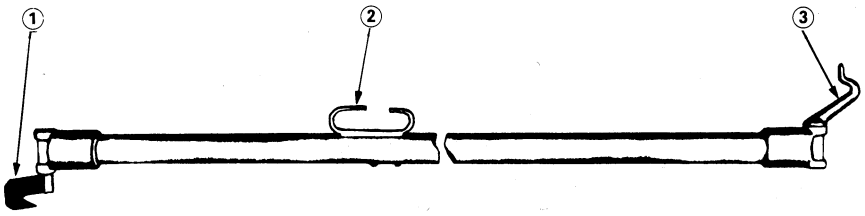
2.1.9 Tie Stick

Used to install or remove tie wires.



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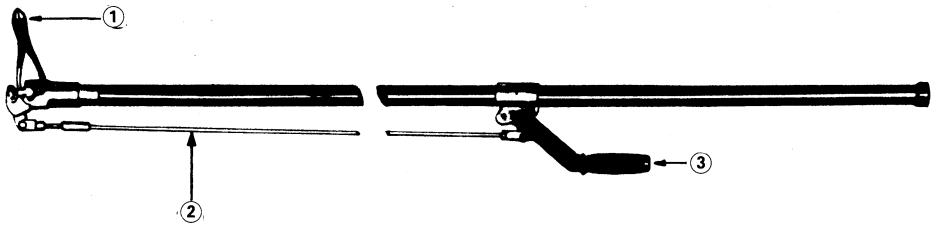
① Rotary blade
② Combination hanger-hook and tie-wire
③ Rotary prong

2.1.10 Tie Wire Cutter

Used to cut tie wires.



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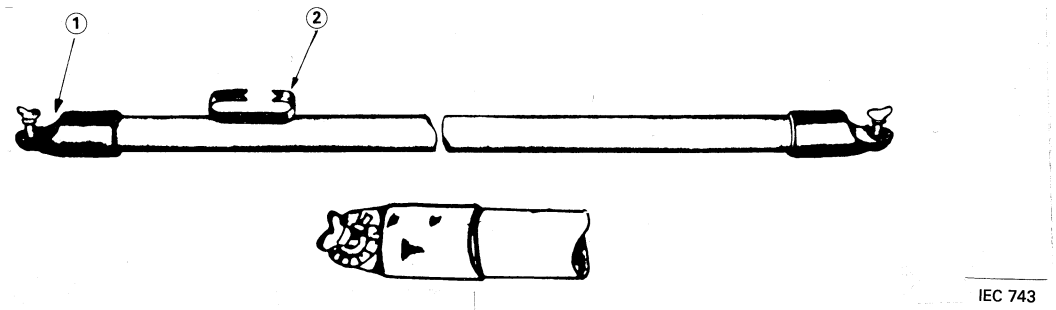
① Cutting plier
② Control rod
③ Operating lever

2.1.11 Universal Hand Stick

A tool to the end of which universal tools can be attached.



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① Splined end-fitting
② Combination hanger-hook and tie-wire

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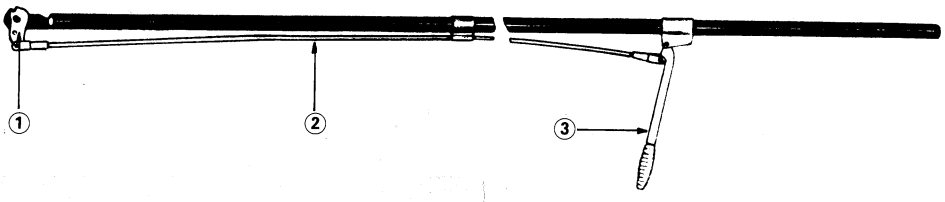
2.1.12 Wire Cutter Stick

Used to cut conductors or binding wires.



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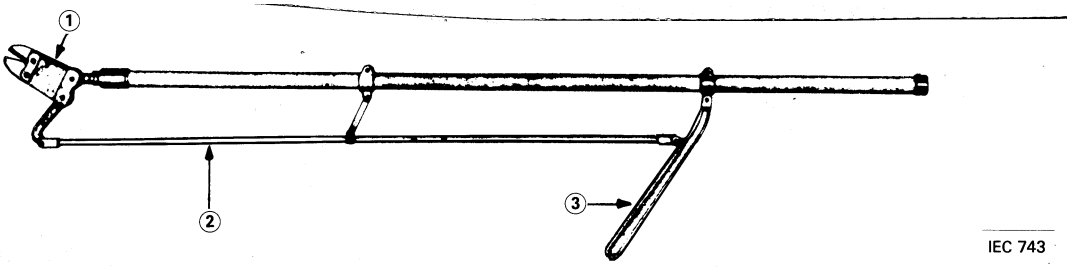
① Cutting head
② Control rod
③ Operating handle

Lever-type (light duty)



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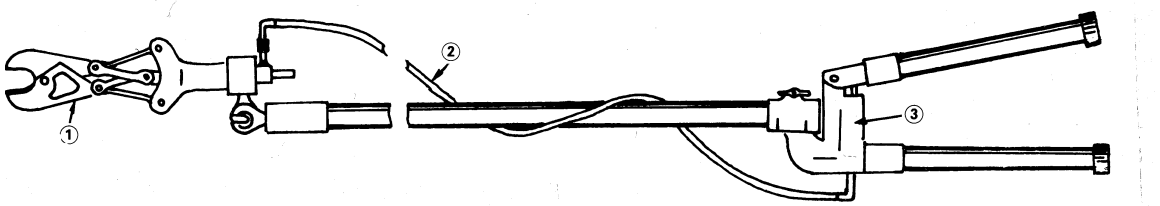
① Cutting head
② Control rod
③ Operating handle

Lever-type (medium duty)



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① Cutting head
② Flexible hose
③ Hydraulic pump

Hydraulic

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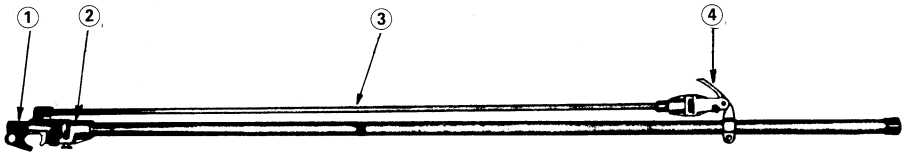
2.1.13 Wire Holding Stick

Used to hold conductors or wire during operations.



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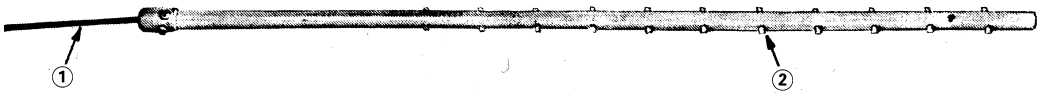
① Adjustable jaw
② Adjustable tilting head
③ Control rod
④ Locking lever

2.2 Support Sticks

2.2.1 Adjustable Strain Stick

A support tool that, with various accessories, can be used to lift or tension wires.



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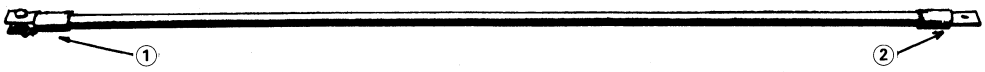
① Screw
② Metal adjustment-pin

2.2.2 Clevis/Tongue Stick

A support tool used with appropriate attachment and/or adapters to perform various operations.



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① Clevis
② Tenon (tongue)

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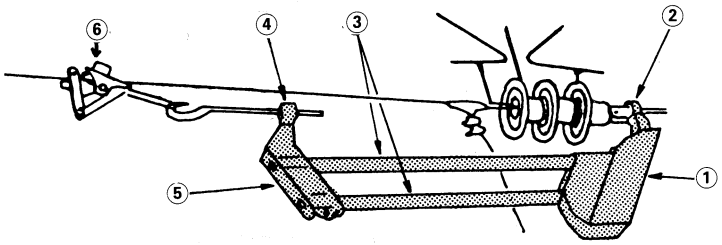
2.2.3 Deadend Tool

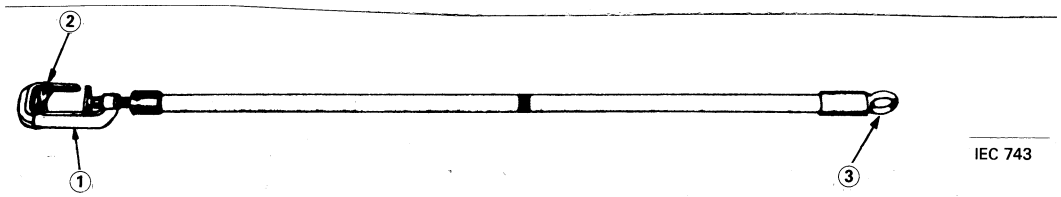
Used to hold the tension of a conductor, in order to replace a deadend string of insulators.



① Flange (with insulated cover)
② Hook
③ Poles (sticks)
④ Jacking-screw
⑤ Flange
⑥ Automatic come-long clamps (wire grips)

2.2.4 Roller Link Stick

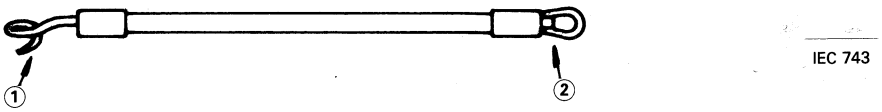
A link stick equipped with a roller that allows its movement along the conductor.



① Head
② Roller
③ Swivel eye (butt-ring)

2.2.5 Spiral Link Stick

A tension link stick equipped with a spiral link at one end.



① Spiral link
② Swivel eye (butt-ring)

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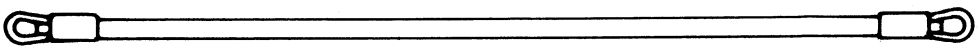
2.2.6 Swivel Link Stick

A tension link stick equipped with a swivel eye at one or both ends.



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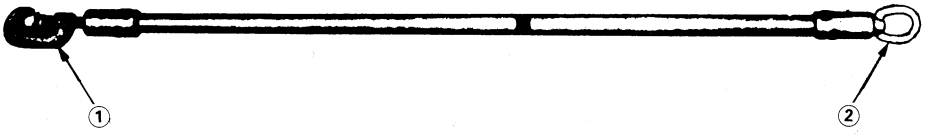
2.2.7 Tension Link Stick

Used to apply tension to a component (or conductor).



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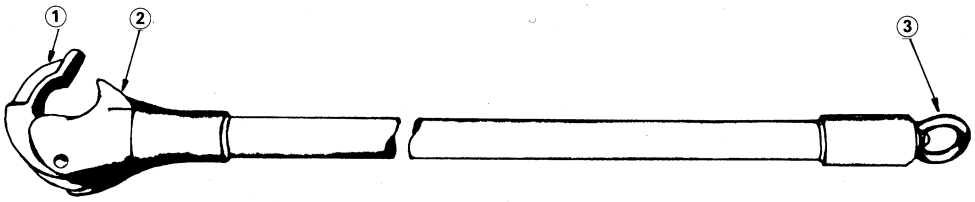
① Jaws
② Swivel eye (butt-ring)

2.2.8 Wire Support Stick

Used to position or move a conductor.



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① Movable jaw
② Fixed jaw
③ Swivel eye (butt-ring)

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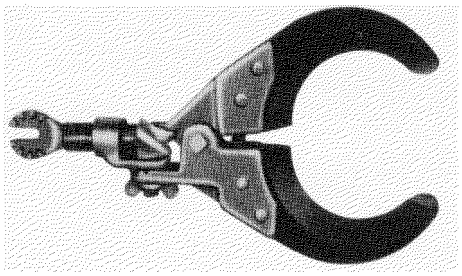
3. Universal Tool Fittings

3.1 Splined End-Tools

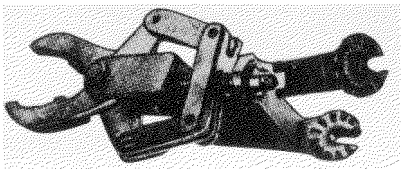
3.1.1 Adjustable Insulator Fork

Used to control insulators during their installation or removal. May have insulated adjustable jaws.



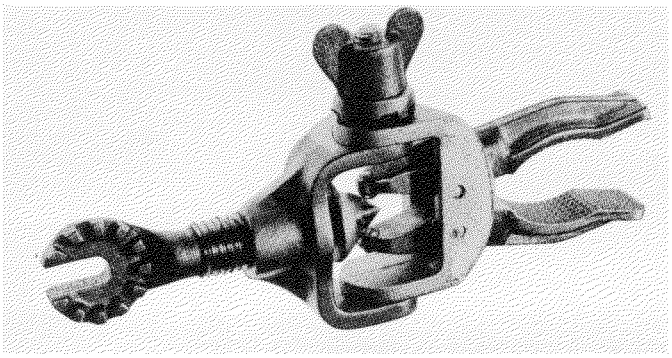
3.1.2 Adjustable Pliers

Used to grip small parts.



3.1.3 All-Angle Pliers

Used to hold various loose parts adjustable to various angles.



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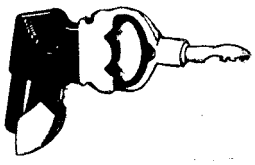
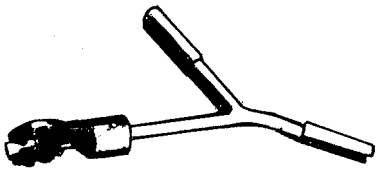
3.1.4 Ammeter Holder

Used to hold a clip-on ammeter.



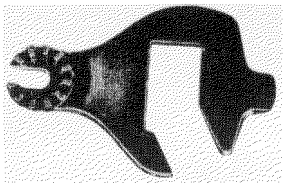
3.1.5 Anti-Interference Braid Applicator

Used to install antistatic braids between the pin of the insulator and the conductor clamp.



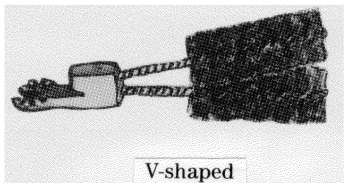
3.1.6 Ball Socket Adjuster

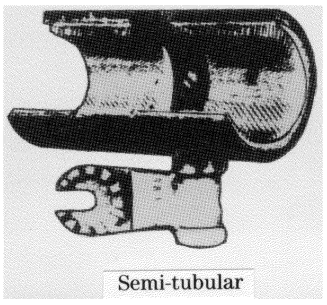
Used to hold a ball socket during connection and disconnection.



3.1.7 Conductor Cleaning Brush

Used to clean conductors.





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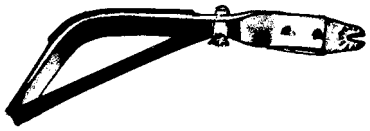
3.1.8 Conductor Sander

Used to polish the conductor surface.



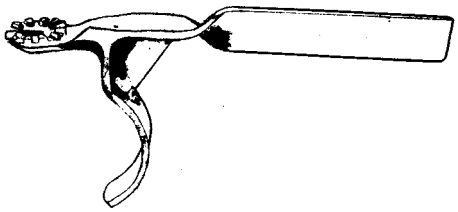
3.1.9 Cotter Key Installer

Used to install split pins, cotter keys, etc.



3.1.10 Cotter Key Installer-Remover

Used to install or remove split pins, cotter keys, etc.



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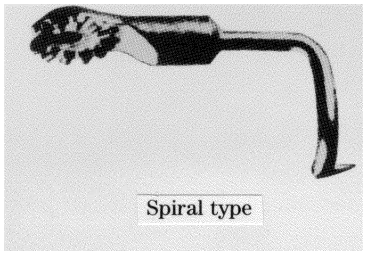
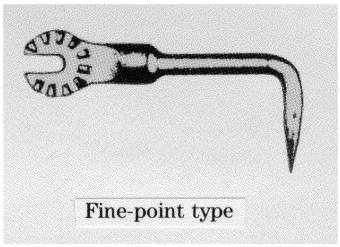
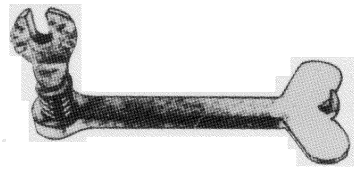
3.1.11 Cotter Key Remover

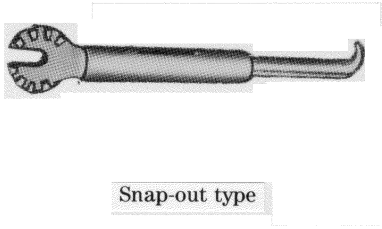
Used to pull cotter keys from fittings or hardware.





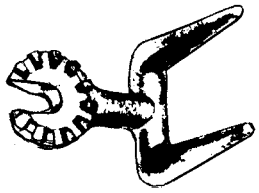


Cam type (pry type)



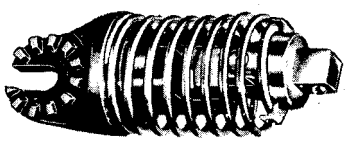
3.1.12 Fixed Double-Prong Head

Used to manipulate tie wire or equipment.



3.1.13 Flexible Wrench Head

Used with removable socket to tighten or loosen nuts and bolts.



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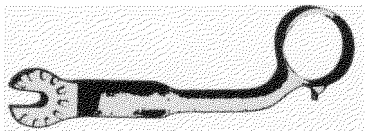
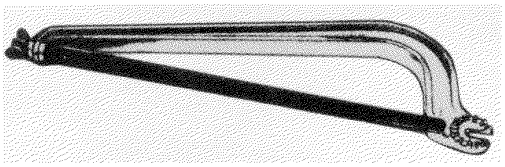
3.1.14 Formed Wire Tool

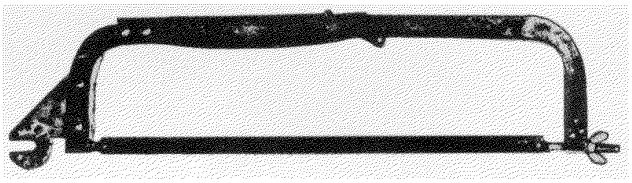
Used to install and remove formed or pre-formed tie wire.



3.1.15 Hack Saw

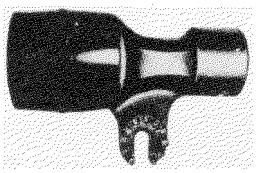
Used for sawing any metal part.





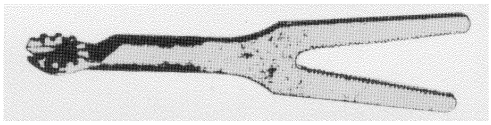
3.1.16 Hammer

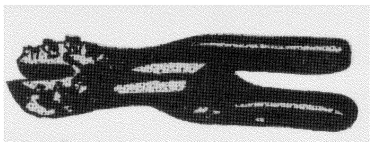
Used to impact equipment as required.



3.1.17 Holding Fork.

Used to hold components in position when using other tools.





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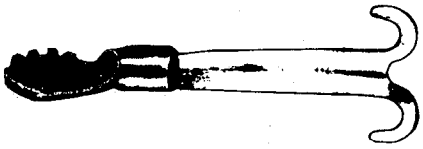
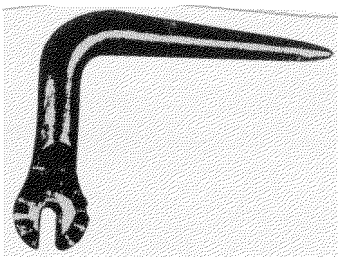
3.1.18 Insulator Ball Guide

Used to engage or disengage the ball of a ball socket fitting.



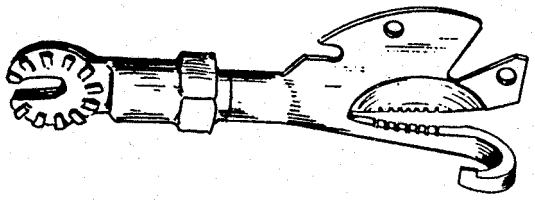
3.1.19 Locating Drift

Used to align two holes or to push a pin.



3.1.20 Mechanical Hand

Used as a hand as pliers for forming tie wires.



3.1.21 Mirror

Attached to a universal hand stick; used to inspect parts that are not directly visible.



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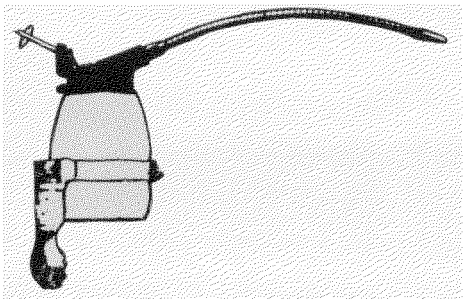
3.1.22 Oilcan

Used to apply a lubricant or rust penetrant.



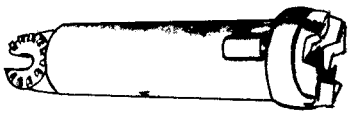
3.1.23 Pin Holder

Used to hold a pin.



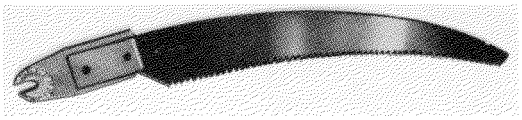
3.1.24 Positive Grip Clamp Stick Head

Used to hold any component equipped with an eye.



3.1.25 Pruning Saw

Used to trim tree branches.



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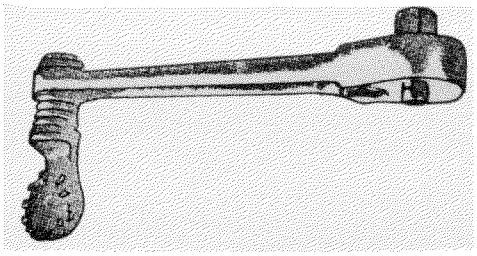
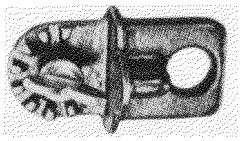
3.1.26 Ratchet Wrench

Used with removable sockets to tighten or loosen nuts and bolts.



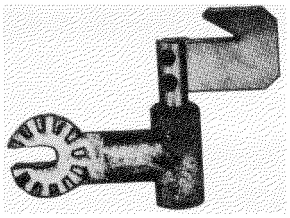
3.1.27 Retractable Hook Stick Adaptor

Device used to adapt a retractable hook stick to permit the attachment of universal accessories.



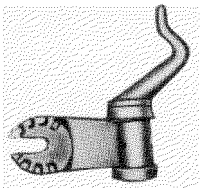
3.1.28 Rotary Blade

Used to manipulate tie wires.



3.1.29 Rotary Prong

Used to manipulate tie wires or insulating blankets.



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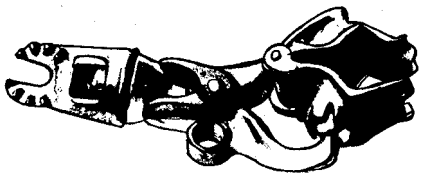
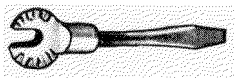
3.1.30 Screw Clamp

Used to grip and position an insulator cap by its adjustable jaws.



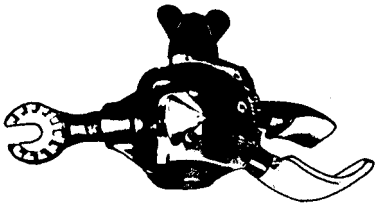
3.1.31 Screwdriver

Used to tighten or loosen screws.



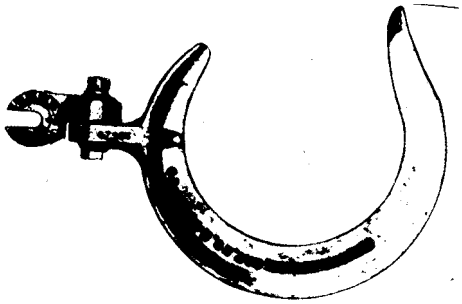
3.1.32 Self-aligning Fuse Puller

Used to grip, remove, and install fuses.



3.1.33 Shepherd's Hook

Used to guide insulators.



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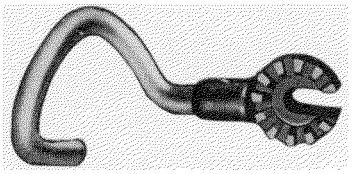
3.1.34 Spiral Disconnect

Used to handle various types of equipment fitted with eyes.



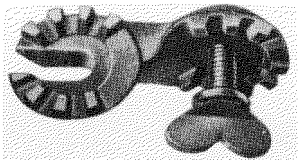
3.1.35 Tie Wire Cutter

Used to snap tie wire.



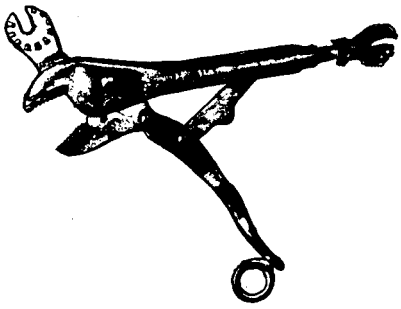
3.1.36 Universal Adaptor

Used to change the angle of attachment on a universal hand stick.



3.1.37 Vice Grip Pliers

Used to hold various parts.



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3.1.38 Wrench

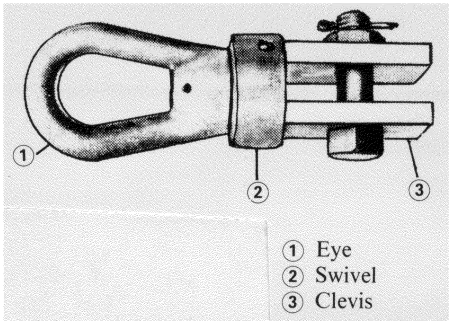
Used to hold nuts and bolts.



3.2 Clevis and Tongue Tools

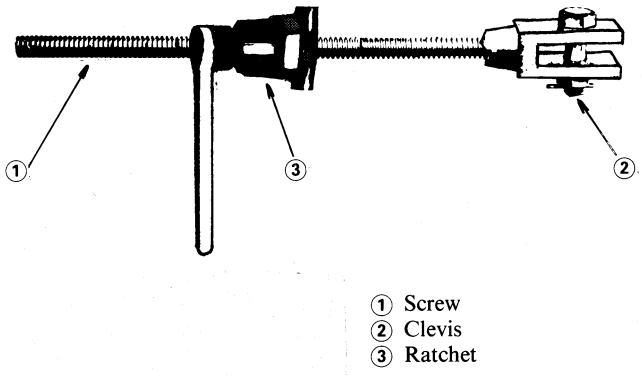
3.2.1 Clevis Eye Attachment

Used to convert a tongue stick into a support stick.



3.2.2 Clevis Screw Adapter

Used in conjunction with a ratchet to apply and release mechanical loads.



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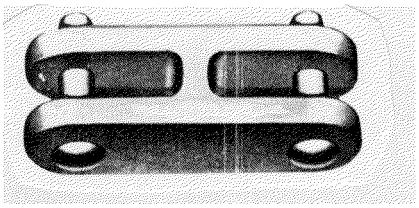
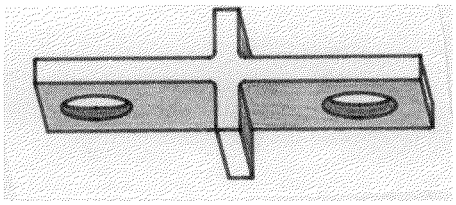
3.2.3 Clevis-Tongue Adapter

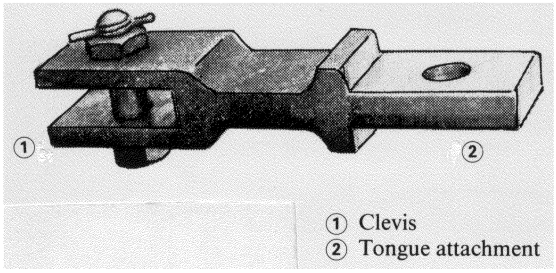
Used to convert a clevis-tongue stick into a clevis-clevis or tongue-tongue stick.





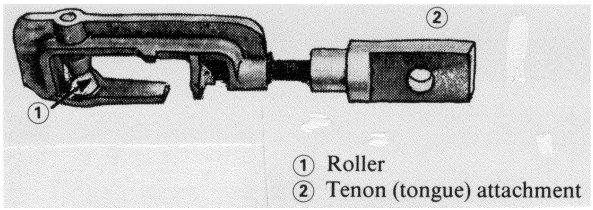
3.2.4 Clevis-Tongue Extension

Used to extend a clevis end stick.



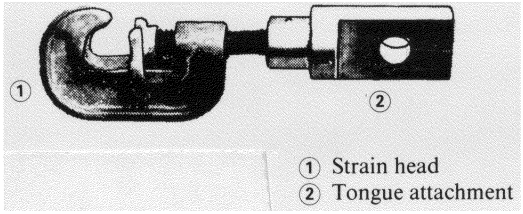
3.2.5 Roller-Tongue Attachment

Used to convert a clevis-tongue stick into a roller link stick.



3.2.6 Strain Link Tongue Attachment

Used to convert a clevis stick into a strain link stick.



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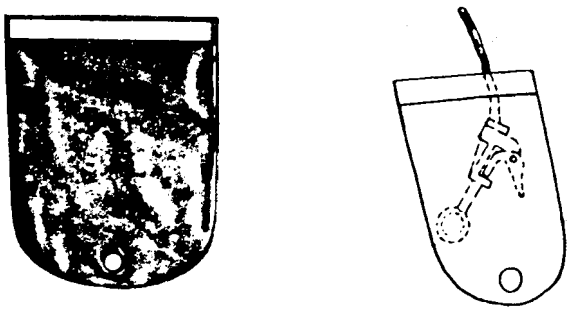
4. Insulating Covers and Similar Assemblies

4.1 Shaped Covers

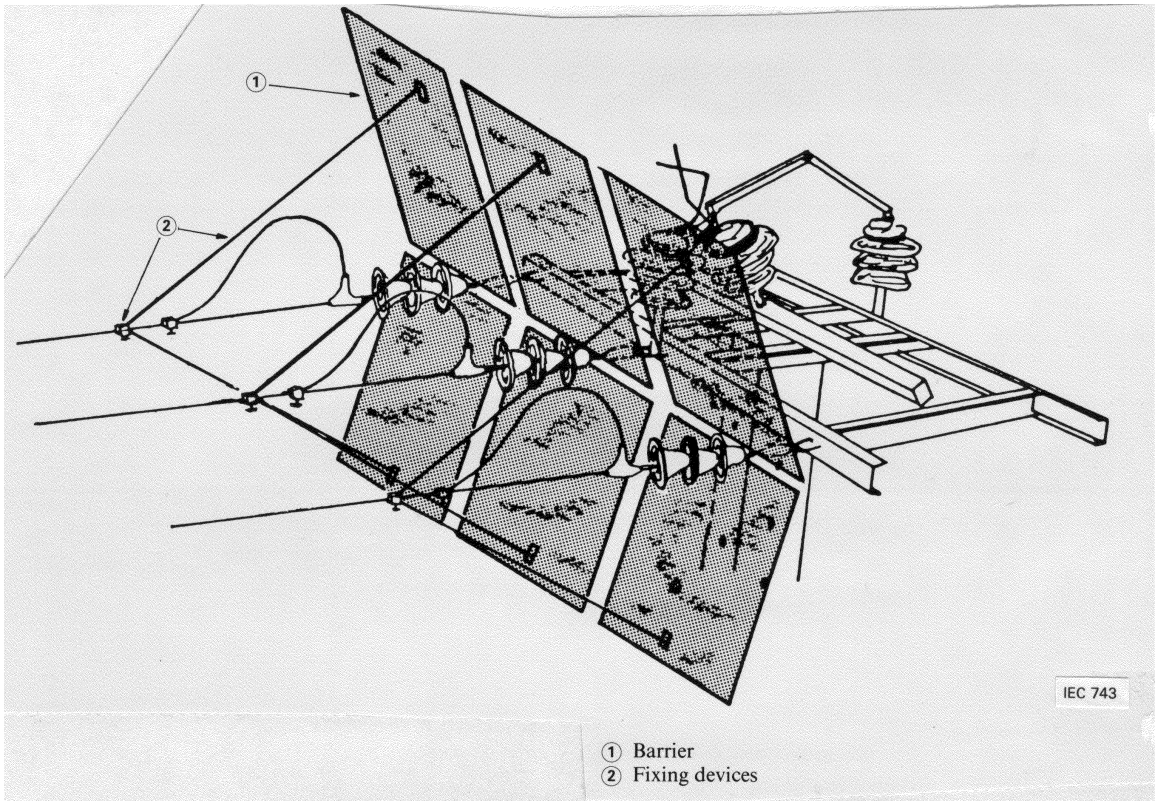
4.1.1 Bag

Made of insulating material to cover conductive fittings.



4.1.2 Barrier

Made of insulating material and generally used to limit the work zone.



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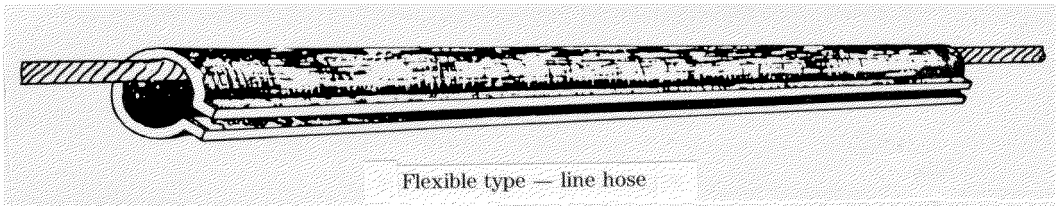
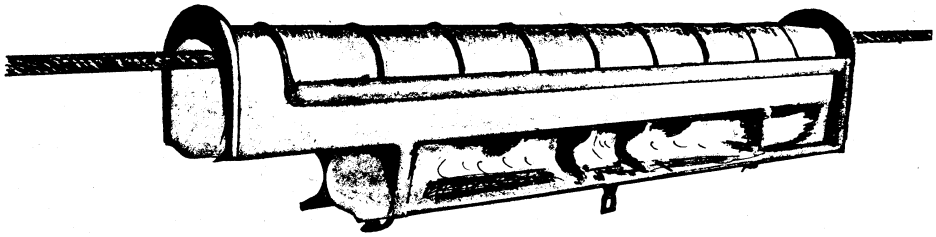
4.1.3 Conductor Cover

Made of insulating material and used to insulate conductive parts. It can be of a flexible or rigid type, according to the material used.



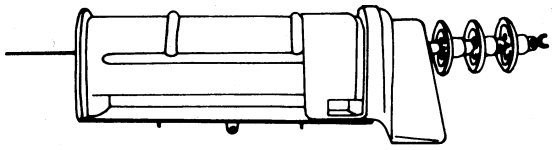
Flexible type — line hose



Rigid type — line guard

4.1.4 Dead-End Clamp Cover

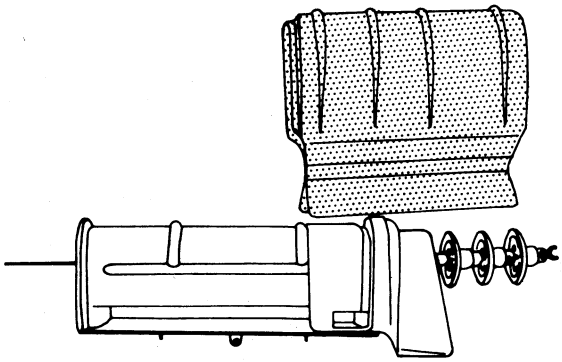
Insulating cover used to cover dead-end clamps.



Rigid type

4.1.5 Dead-End Cover

Insulating cover used to cover dead ends.



Rigid type

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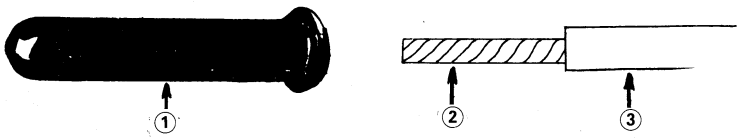
4.1.6 End-Cap.

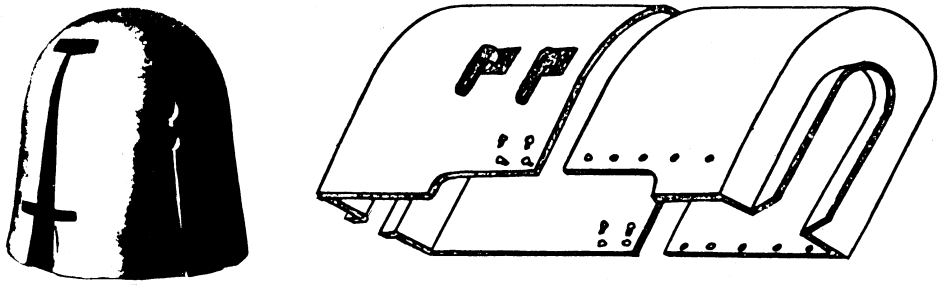
Made of rubber or synthetic material and used to insulate the exposed ends of an insulated conductor.



① End-cap
② Bare wire
③ Insulation

4.1.7 Pin-type Insulator Cover

Insulating cover used to cover pin-type insulators.

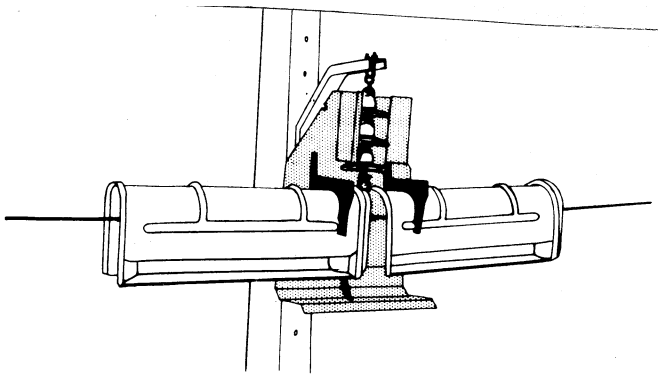


Flexible type

Rigid type

4.1.8 Suspension String Cover

Insulating cover used to cover suspension insulator strings.



Rigid type

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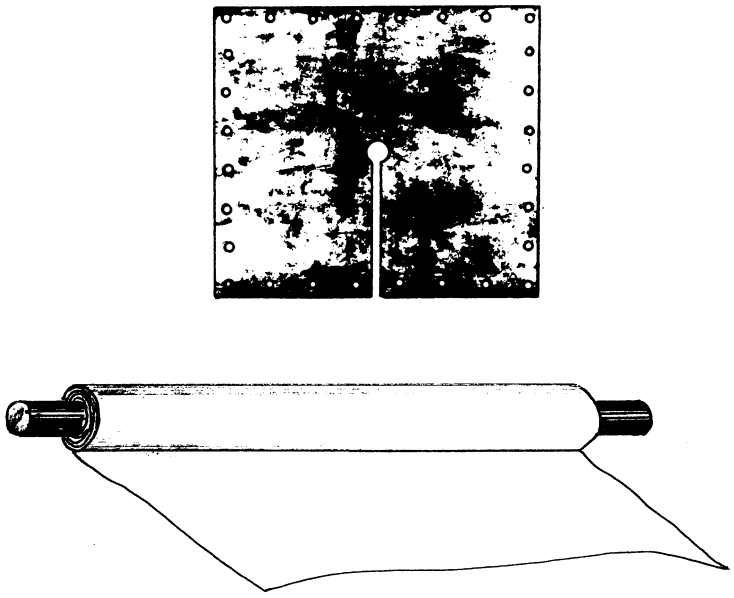
4.2 Blanket (Flexible Cover)

Made of rubber or synthetic materials, used to insulate conductors or metallic parts, energized or not.



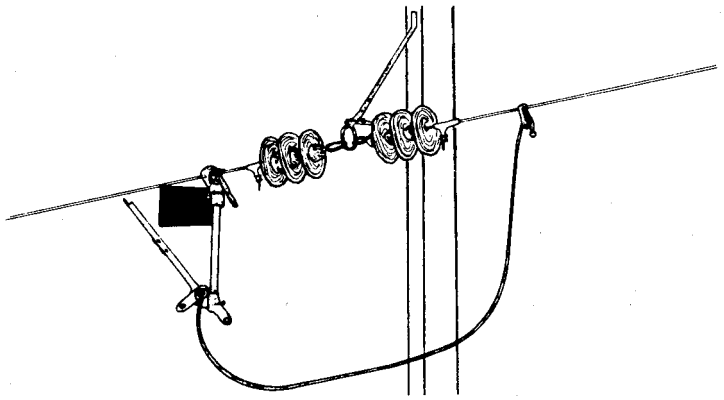
Flexible cover

5. Bypassing Equipment

5.1 Shunting Equipment

5.1.1 Loadbreak

Single-phase switch used to connect or disconnect a circuit under load.



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5.1.2 Shunting Fork

A metal fork fitted to an insulating stick and used to

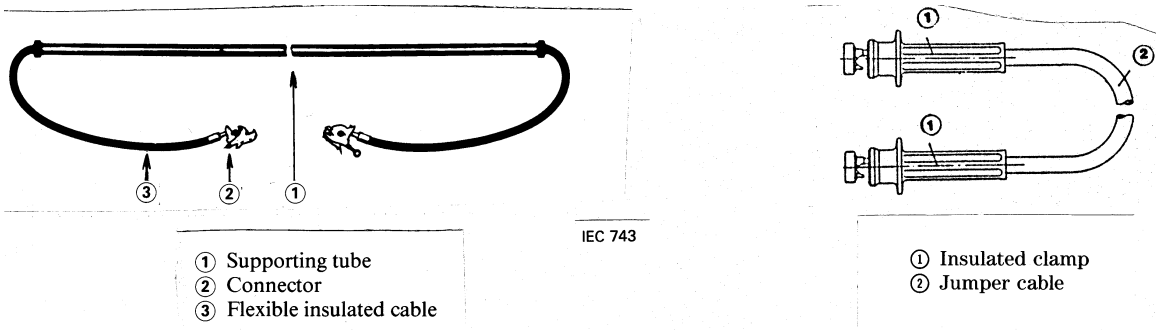
1) bypass a fuse
2) open or close under load



5.2 Shunt

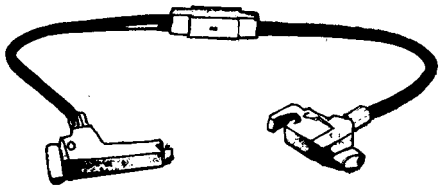
5.2.1 Bypass Jumper

Generally made of single-core insulated cable, used during the maintenance of various types of apparatus. May be covered by a rigid tube.



5.2.2 Fused Bypass Jumper

Single-core insulated cable fitted with a fuse and used during the repair of a fuse or the maintenance of various types of apparatus.



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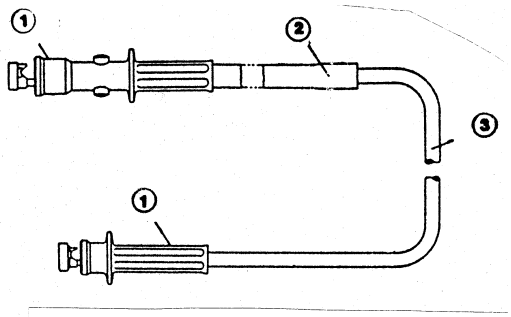
5.2.3 Load Pickup Jumper

Single-core insulated cable, fitted on one end with an insulated clamp and on the other with an insulated clamp containing contacts that can be opened or closed. The contacts can be closed to pick up a load, but it has no load break rating.



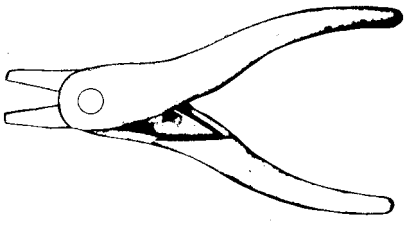
① Insulated clamp
② Operating handle for load pick-up
③ Jumper cable

6. Small Individual Hand Tools

6.1 Insulating Equipment

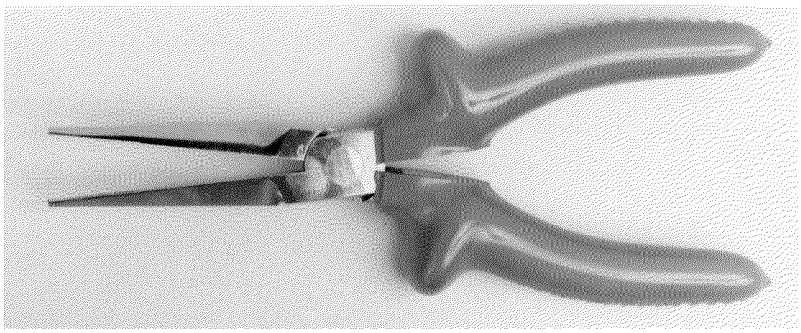
6.1.1 Cutting Nipper

A tool with metal cutting edges.



6.1.2 Flat or Round Nose Pliers

Used for handling a conductor.



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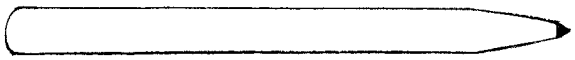
6.1.3 Lever

Used to open the sheath of cable or to pry the covering off conductors.



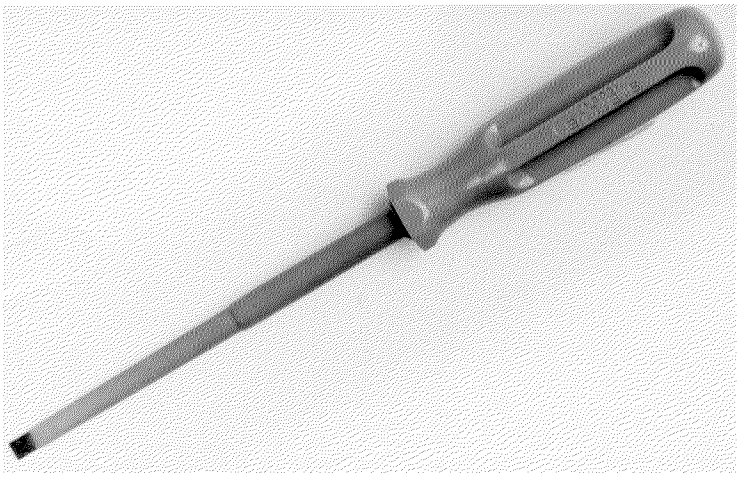
6.1.4 Punch

A tool with a metal point used to break solid insulating material.



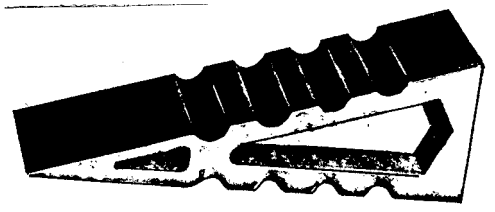
6.1.5 Screwdriver

A tool with metallic end fitting, used to install and remove screws.



6.1.6 Wedge

Used to separate the phase conductors of a cable.



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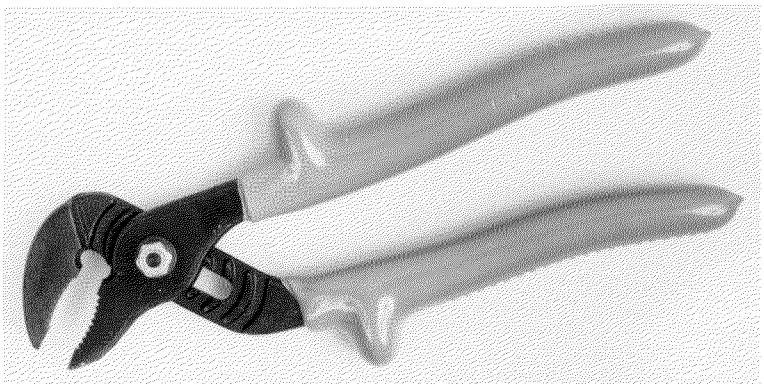
6.2 Insulated Equipment

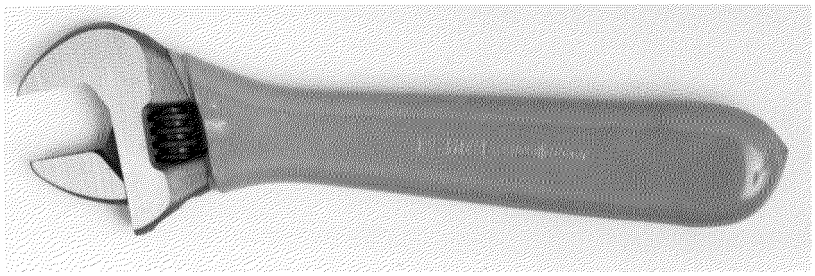
6.2.1 Adjustable Pliers

Used to handle, tighten, or loosen various pieces.



6.2.2 Adjustable Wrench, Open End

Used to tighten or loosen nuts and bolts.



6.2.3 Cable Cutter

Used to cut cables.



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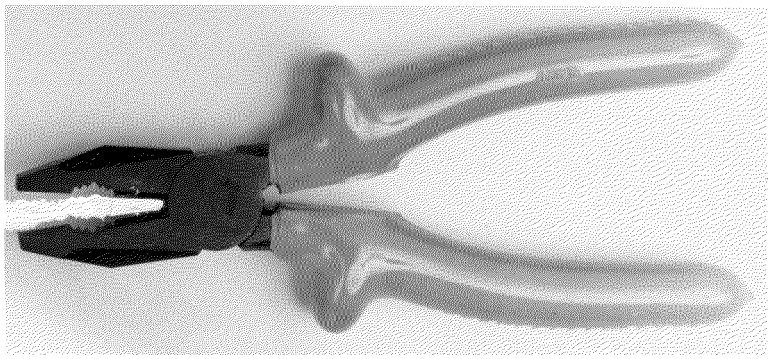
6.2.4 Combination Pliers

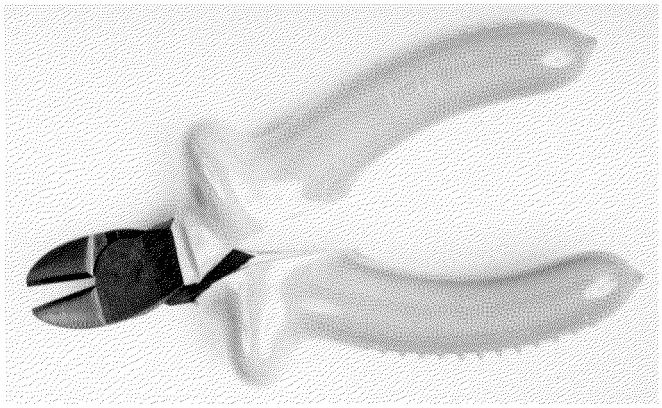
Used to hold various pieces or to cut wire.



6.2.5 Cutting Nipper

Used to cut.





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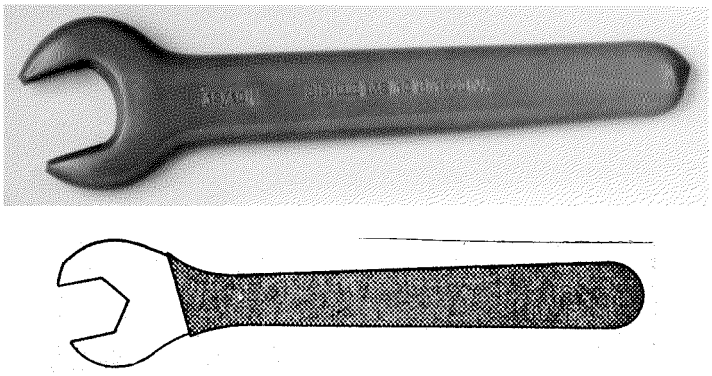
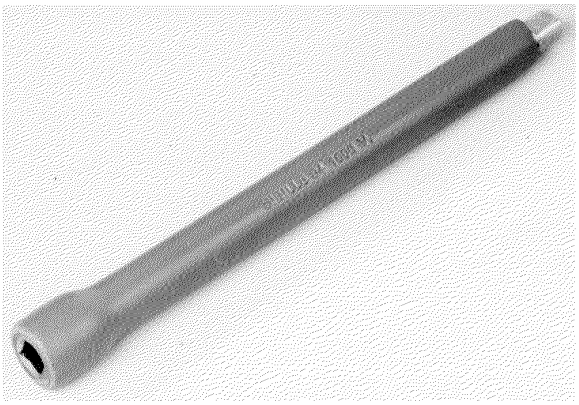
6.2.6 Open End Wrench, Single Head

Used to tighten and loosen nuts and bolts.



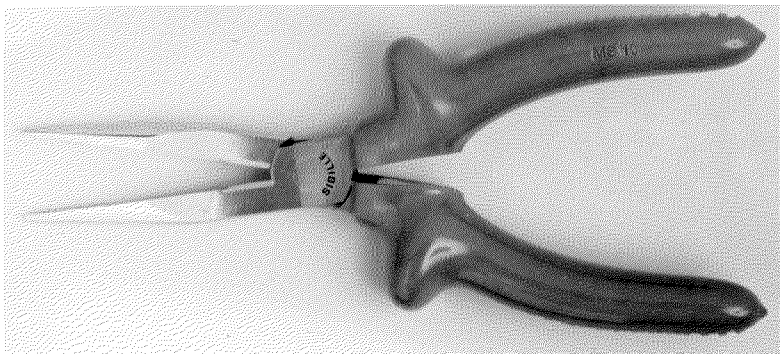
6.2.7 Extension Bar

A covered metal device made to be inserted between ratchet drive handle and socket.



6.2.8 Long-Nose Pliers with or without Side Cutter

Used to grip or tighten components, or to cut.



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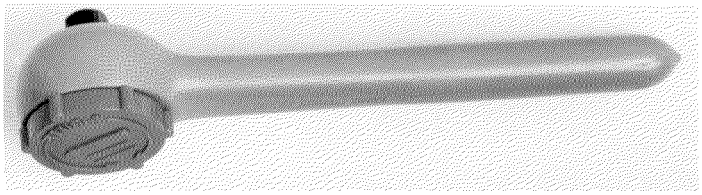
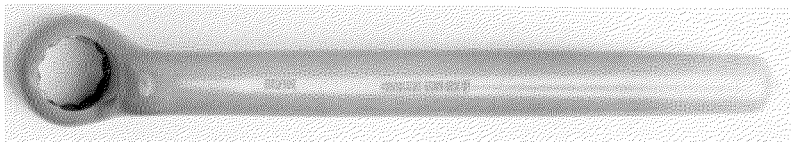
6.2.9 Ratchet Handle, Reversible or Not

Drive ratchet used to hold a socket to tighten or loosen screws, nuts, and bolts.



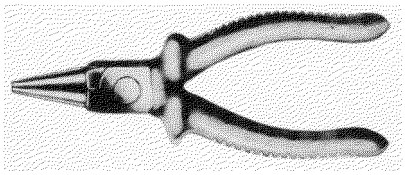
6.2.10 Box End Wrench, Single End, Deep Offset or Not

Used to tighten and loosen nuts and bolts.



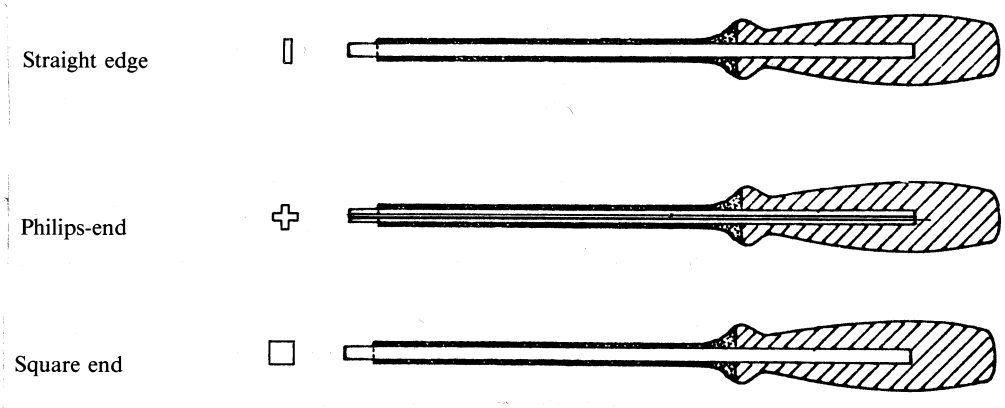
6.2.11 Round-Nose Pliers

Used to hold or bend components.



6.2.12 Screwdriver

Used to install or remove screws. It may have different shapes of ends.



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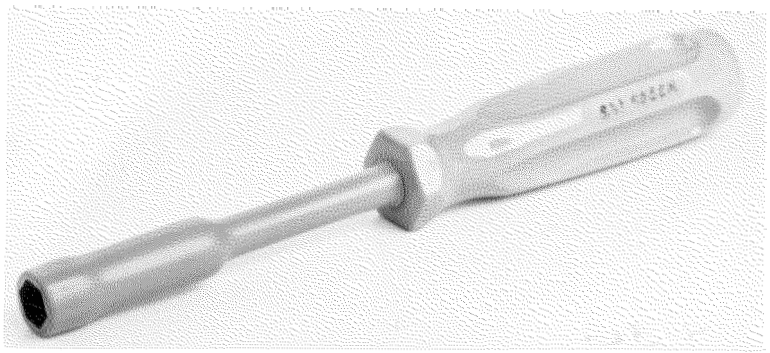
6.2.13 Nut Driver, Spin Type

Used to tighten or loosen screws, nuts, and bolts.



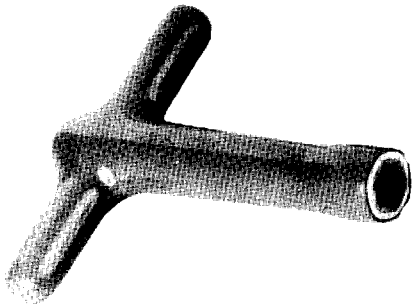
6.2.14 Stripping Knife

Used to strip insulation from conductors.



6.2.15 Tee Wrench

Used to tighten or loosen screws, nuts, and bolts.



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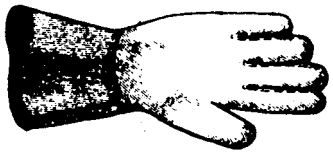
7. Personal Equipment

7.1 Mechanical Protection

7.1.1 Insulating-Glove Protector

Used for mechanical protection of insulating gloves.



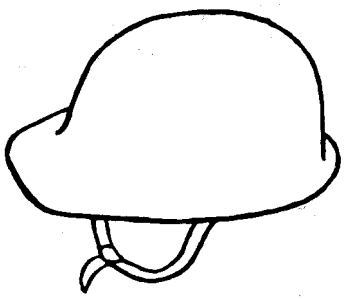
7.1.2 Safety Boots

Equipped with safety toes and toughened puncture-resistant non-slip soles.



7.1.3 Safety Helmet

Made of synthetic material, equipped with a chin strap and adjustable headband.



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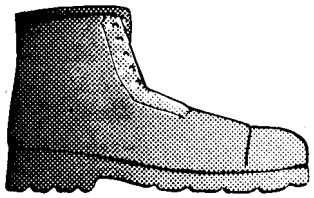
7.1.4 Safety Shoes

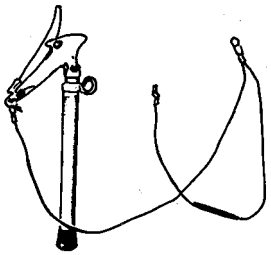
Equipped with safety toes and toughened puncture-resistant non-slip soles.



7.2 Electrical Protection

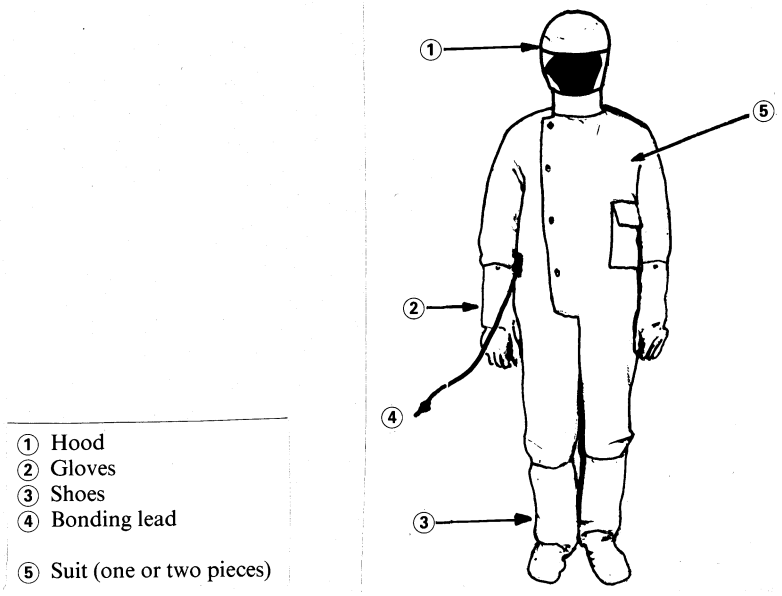
7.2.1 Bonding Lead

Metallic connection used by the worker to connect or disconnect his conductive clothing, grid, or screen, to or from a conductive part of an installation.



7.2.2 Conductive Clothing

Made of natural or synthetic material, interwoven with a conductive thread; used to shield workers from the effect of electric fields.



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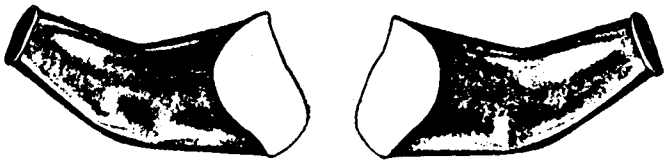
7.2.3 Insulating Arm Sleeves

Made of rubber or synthetic material, used for electrical protection of the worker's arms.



7.2.4 Insulating Boots

Made of insulating material with non-slip soles, used for the electrical protection of the worker's feet.

7.2.5 Insulating Clothing

Made of insulating material, used for electrical protection of the worker's body.

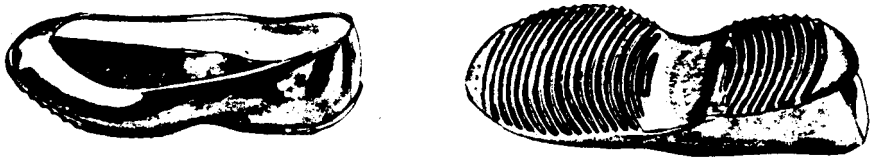
7.2.6 Insulating Gloves

Made of rubber or synthetic material, used for the electrical protection of the worker's hands.



7.2.7 Insulating Overshoes

Made of supple insulating material with non-slip soles, used for the electrical protection of the worker's feet.



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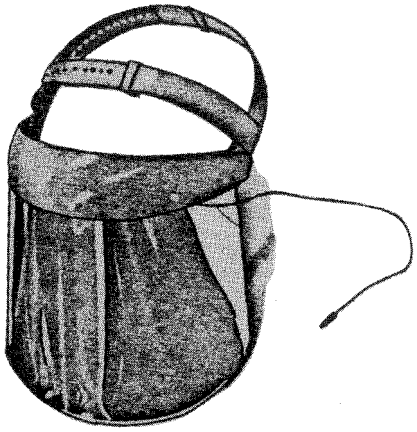
7.3 Miscellaneous

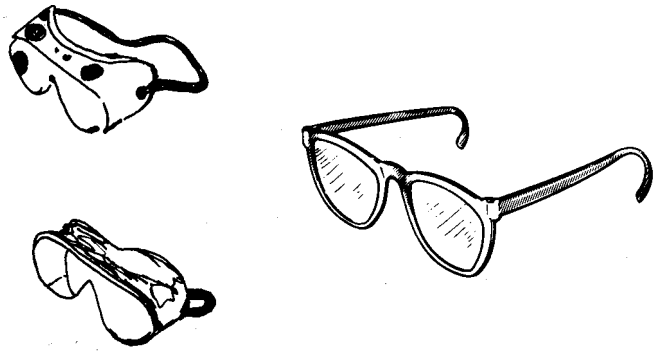
7.3.1 Face Shield

Protection for the complete face. The shield may be clear or tinted, to afford protection from ultraviolet light in the event of an electrical flash.



7.3.2 Safety Spectacles and Goggles.

Spectacles and goggles with shatter-proof lenses and frames of synthetic material. The lenses may be clear or tinted to afford protection from ultraviolet light in the event of an electrical flash.



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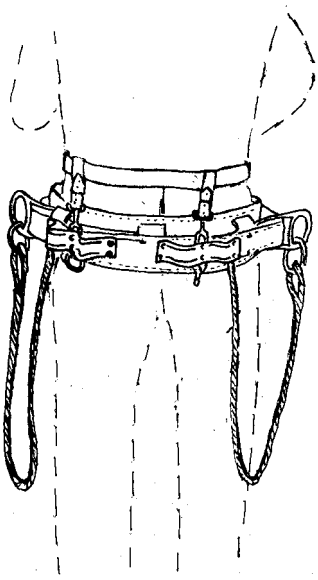
8. Equipment for Positioning a Worker

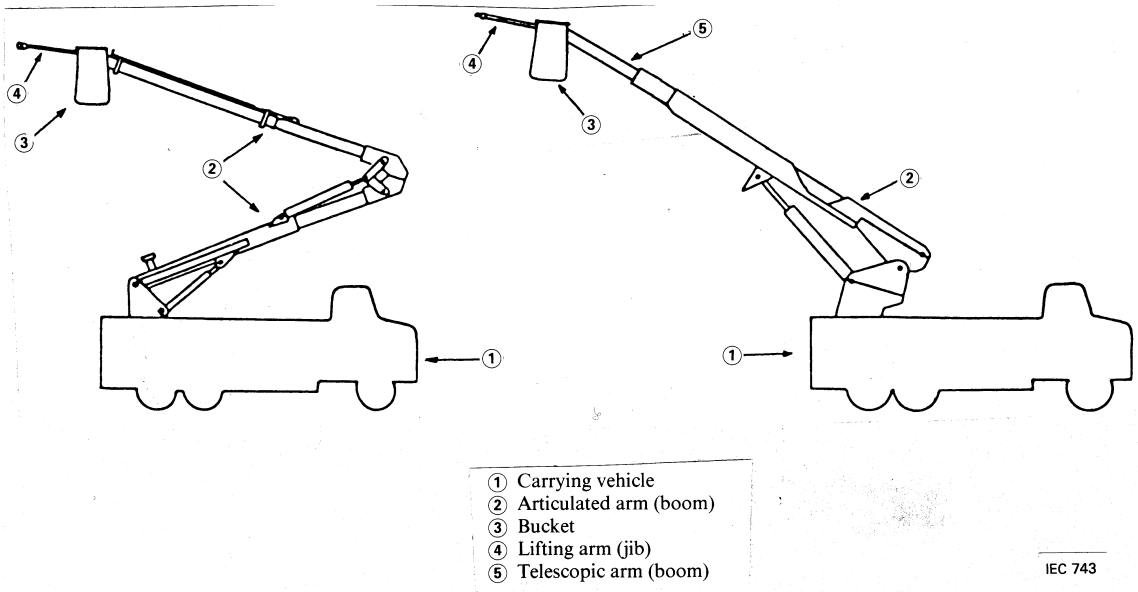
8.1 Body Belt

Made of leather or synthetic material, equipped with adjustable safety strap or a sling, or both.



8.2 Bucket Truck with Insulating Boom

Comprising an insulating boom equipped with one or two buckets. It may be mounted on a vehicle and used to position a worker.



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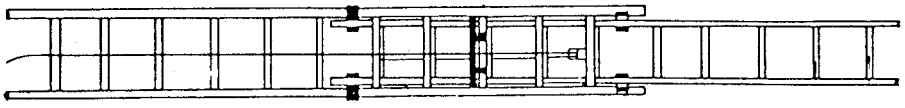
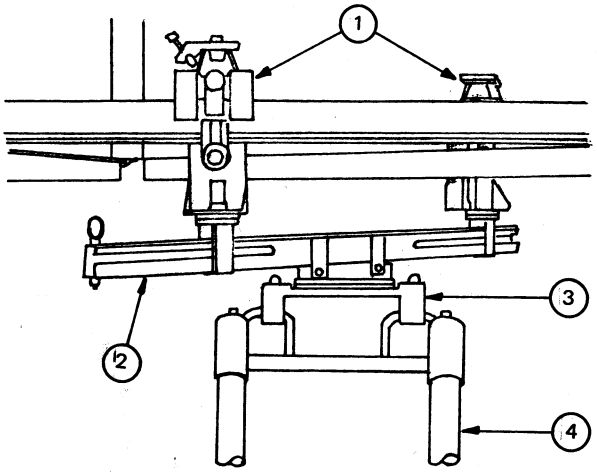
8.3 Extension Ladder

A ladder that can be lengthened by the use of sliding parts that fit into each other.



8.4 Girder Saddle Suspension Attachment

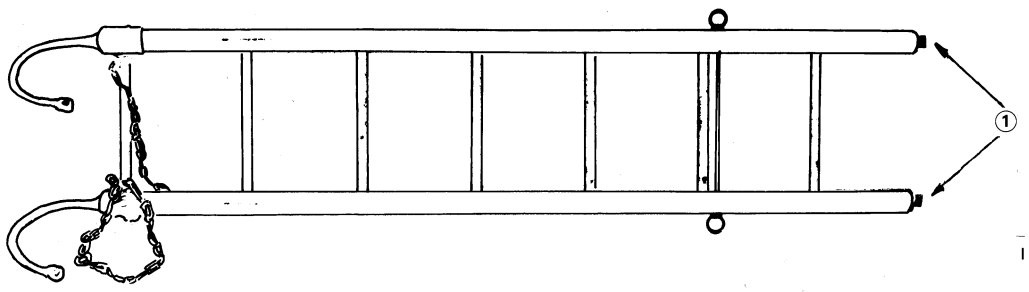
A metal accessory, attached to a structure, that is used to suspend a seat, ladder, etc.



(1) Girder clamp (saddle)
(2) Adjusting groove
(3) Double-hook traverse pivot
(4) Ladder

8.5 Hook Ladder

Equipped with permanent or removable hooks that can be rigid or rotatable.



(1) Splice fittings

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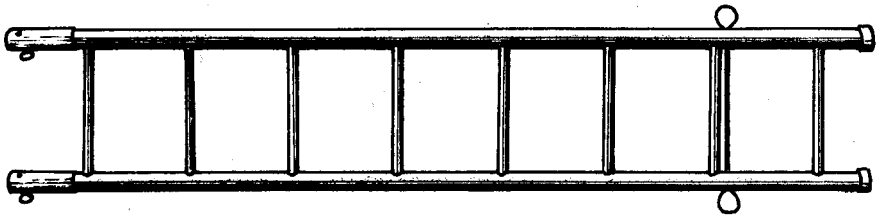
8.6 Insulating Ladder

Made of insulating material.

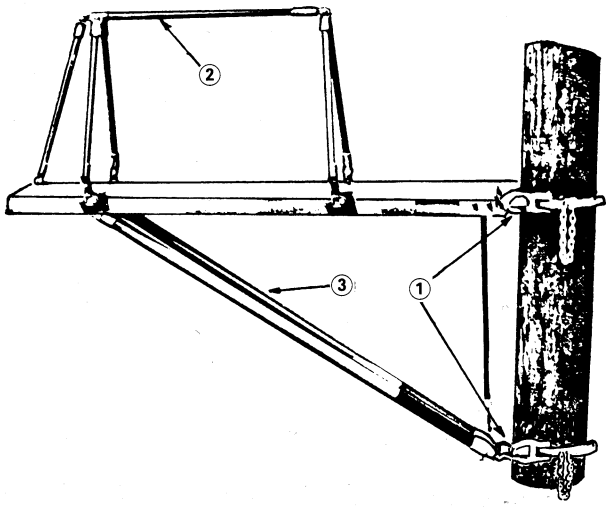
8.7 Ladder Extension

An additional section that can be spliced to another ladder.



8.8 Platform

Constructed of reinforced synthetic material or wood. It is attached to a support to position a worker.



① Chain binder
② Safety rail
③ Support arm

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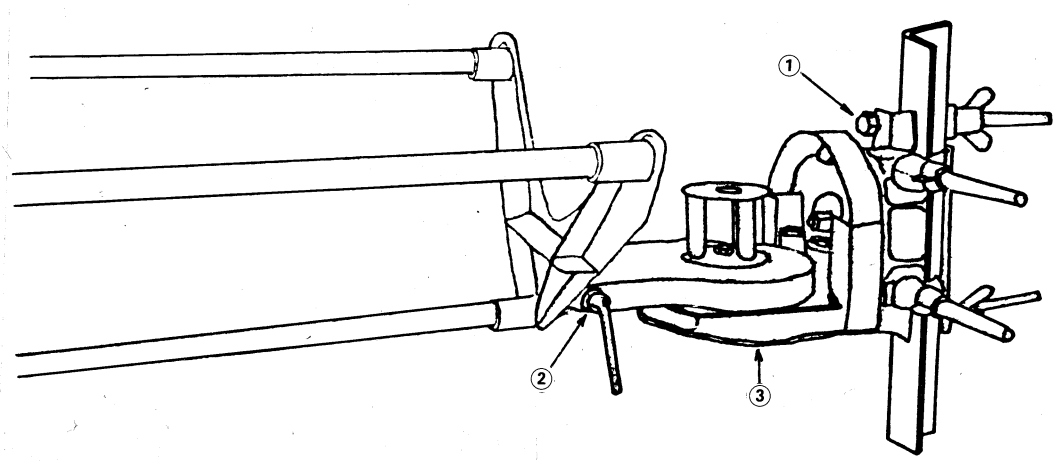
8.9 Platform Pivot Attachment

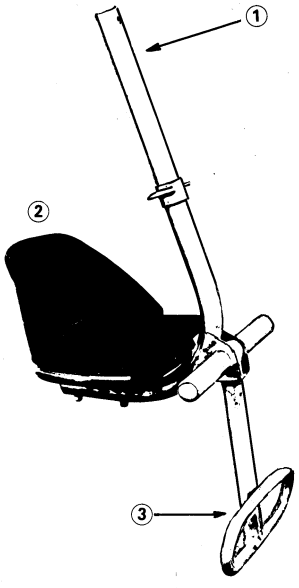
A metal accessory, fixed to a structure, that allows a platform or beam to be moved into a working position.



① Tower-type saddle
② Platform pivot
③ Adjustable mounting-bracket

8.10 Seat

Suspended from a girder saddle to position a worker.



① Support pole (stick)
② Seat
③ Foot-rest

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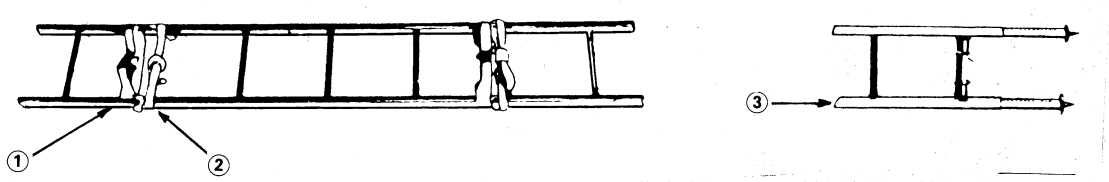
8.11 Spliced Ladder

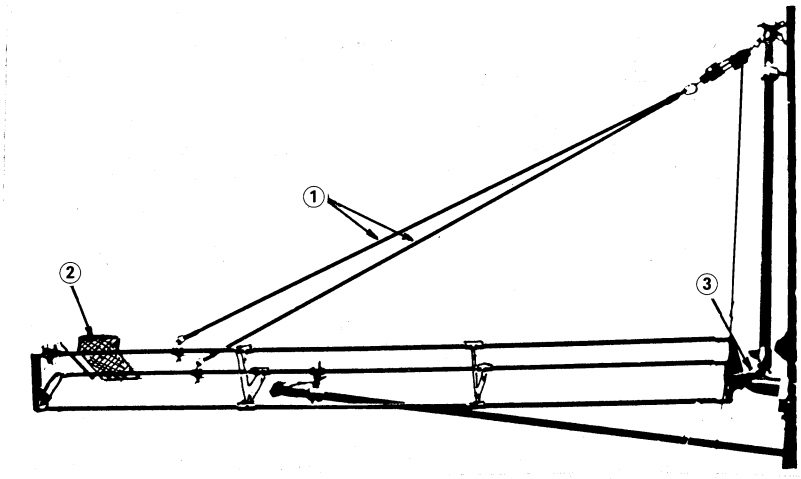
Constructed of sections made of metal or synthetic material spliced together.



① Stile (rail)
② Attachment strap
③ Bottom section (with adjustable feet)

8.12 Triangular Beam

Constructed of insulating tubes and attached to a structure with saddles and rope blocks. It is used to position a worker.



① Support pole (stick)
② Seat
③ Platform pivot attachment (details in Sub-clause 8.9)

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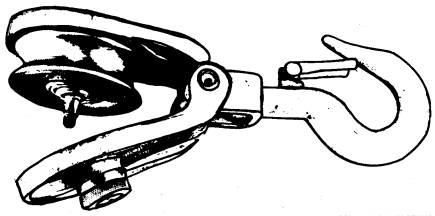
9. Handling and Anchoring Equipment

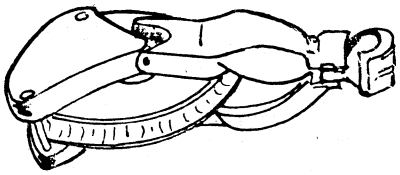
9.1 Rope, Sling, Rope Block, and Accessories

9.1.1 Block

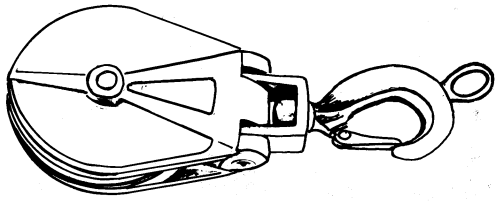
Used in rigging to guide a rope or support a load.



Snatch block



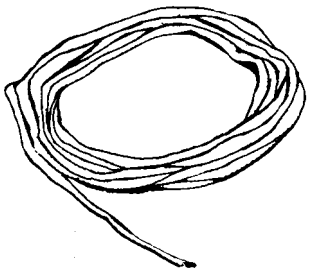
Running block



Block with a gripping ring on the hook

9.1.2 Rope

Made of insulating or non-insulating material.



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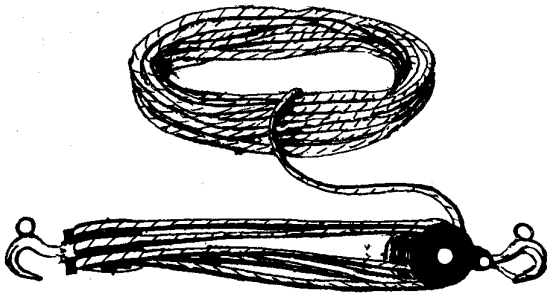
9.1.3 Rope Block

Device used with rope for handling, lifting, or rigging operation.



9.1.4 Sling

A rigging and handling accessory.



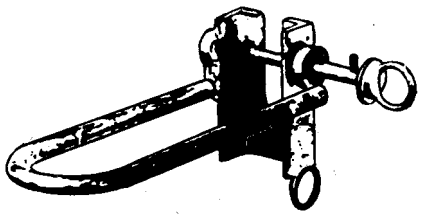
Double-eye type

Endless type

9.2 Yokes and Accessories

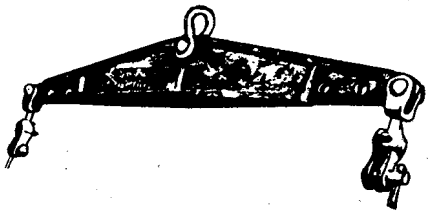
9.2.1 Anchor Clamp Bracket

Used when relieving mechanical tension at a dead-end string.



9.2.2 Lifting Yoke

Usually made of metal, used in lifting.



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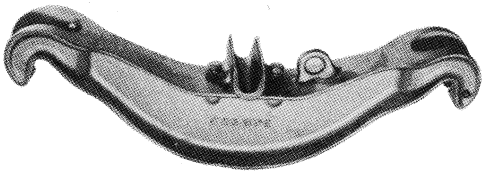
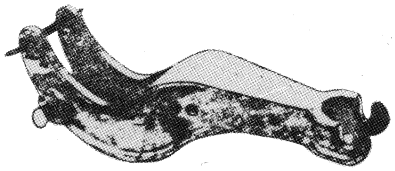
9.2.3 Tool Yoke

A metal tool used with strain carriers to relieve mechanical tension on insulators.



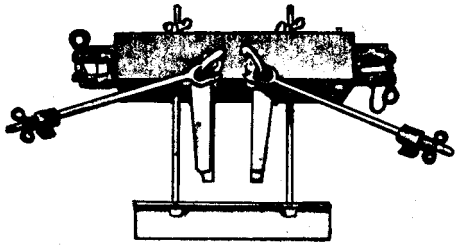
Double stick yoke



Single stick yoke

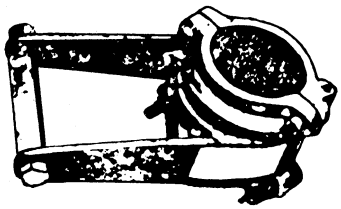
9.2.4 Tower Arm Yoke

A metal tool fixed to a tower to provide an attachment for lift sticks.

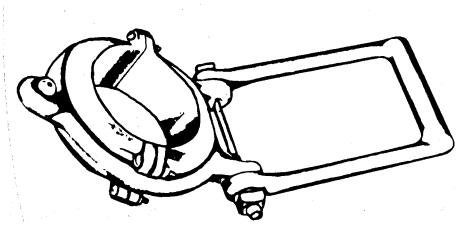


9.2.5 Stirrup, Stick Support

A metal accessory fitted to a support stick to provide a point of attachment.



Rigid stirrup



Swivel stirrup

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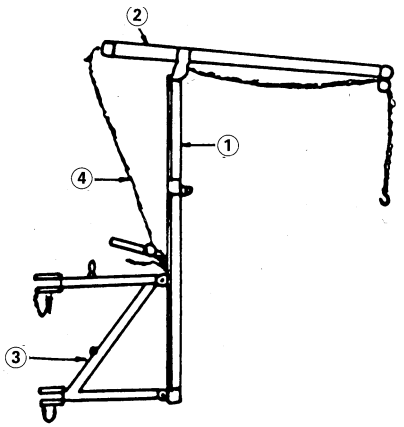
9.3 Gin

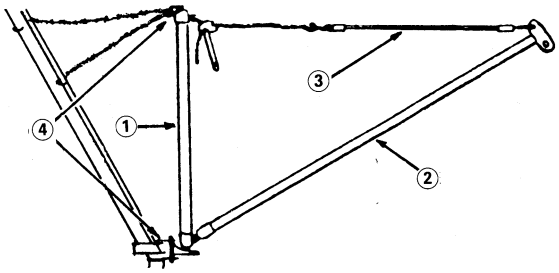
9.3.1 Assembly, Gin

Assemblies used on structures or supports to handle various pieces of equipment.



① Mast
② Boom
③ Support devices
④ Chain hoist (pull lift)

Type A



① Mast
② Boom
③ Suspension link stick
④ Points of attachment (to the support)

Type B

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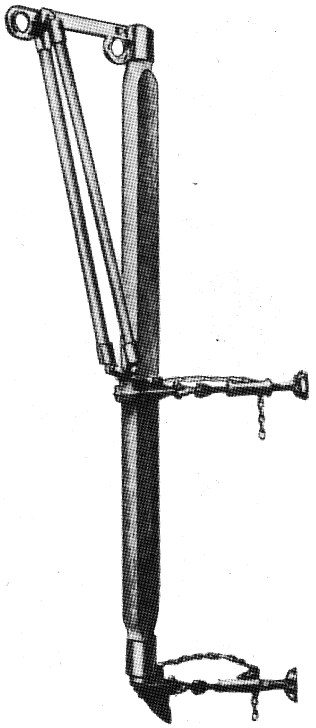
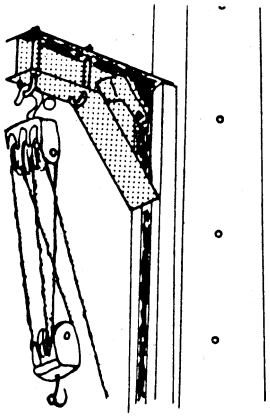
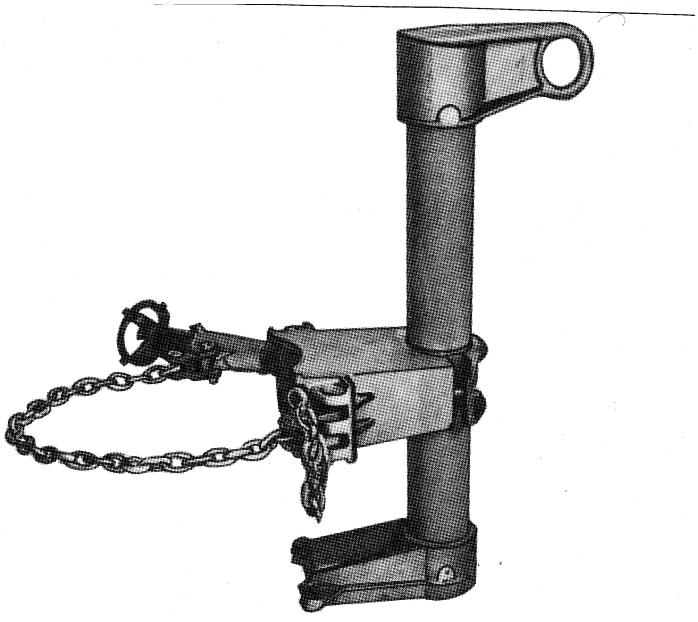


Type C



Type D



Type E

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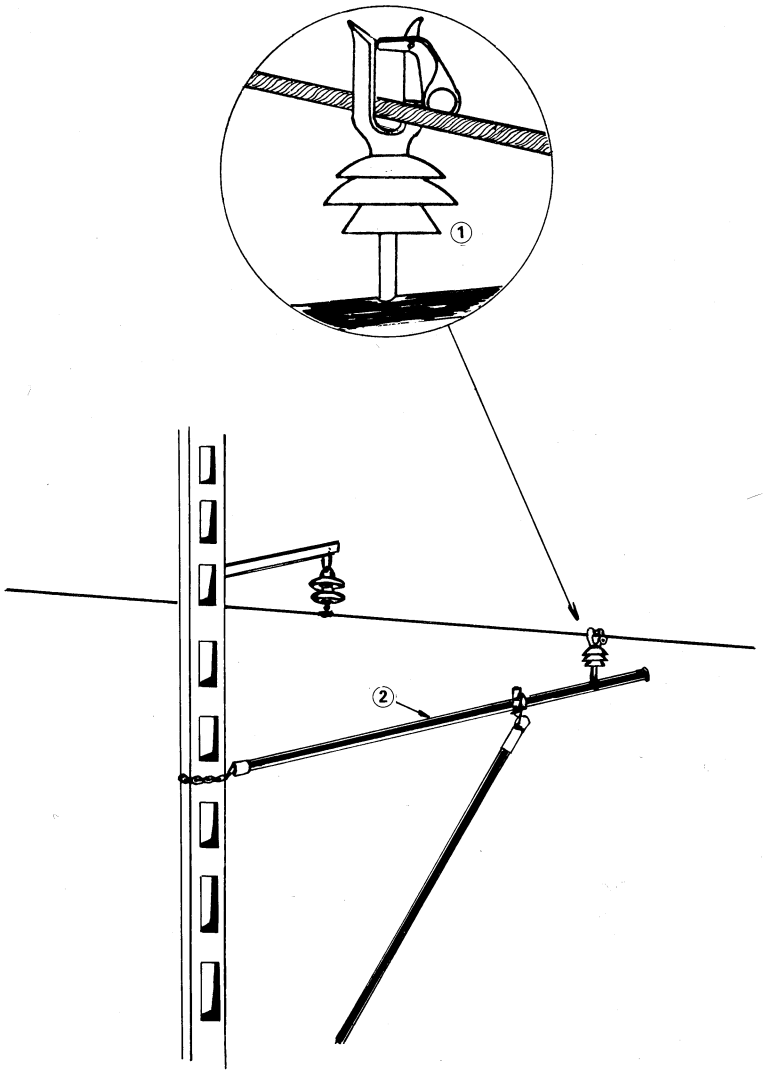
9.3.2 Auxiliary Arm

A pole assembly used a temporary support for conductors or bypass cables.



① Insulator with mechanical wire holder
② Auxiliary arm

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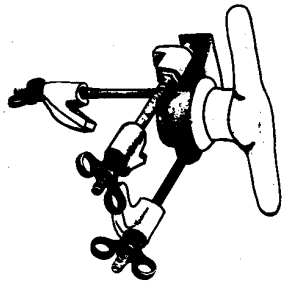
9.4 Saddles and Accessories

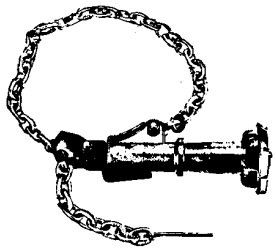
9.4.1 Block Saddle

A metal accessory attached to a tower member and used for securing ropes.



9.4.2 Chain Binder

A metal accessory used to secure pole saddles. It is used to attached various types of support equipment.



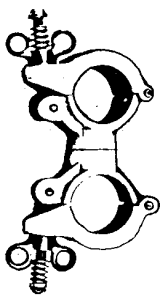
9.4.3 Chain Extension

Used to extend the length of a chain binder.



9.4.4 Double-Stick Clamp

Used to hold two stick together.



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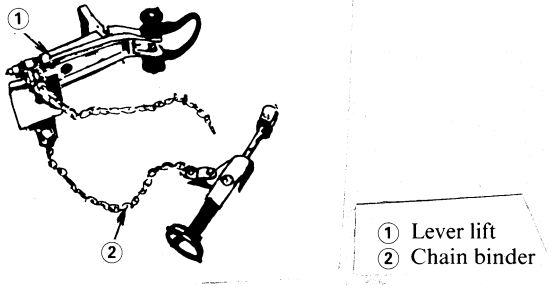
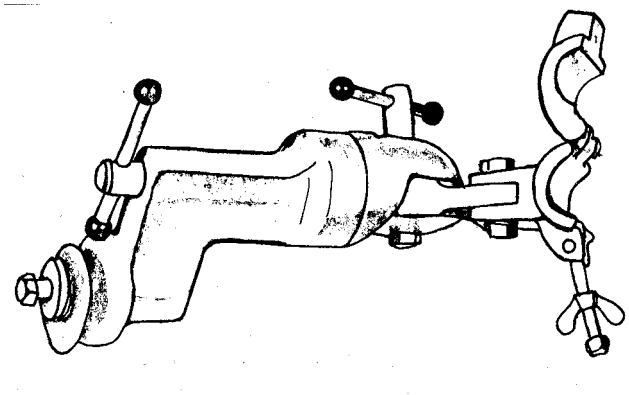
9.4.5 Lever Lift with Chain Binder

A metal accessory attached to a support and used with a support stick to raise or lower a conductor.



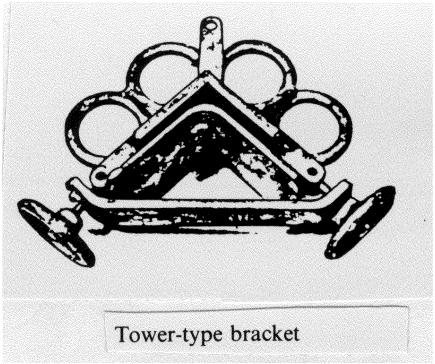
9.4.6 Locking Stick Clamp

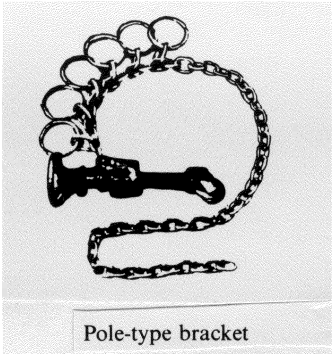
Used with a support stick or saddle, to hold or guide a stick, includes locking device.



9.4.7 Rope-snubbing Bracket

A metal accessory attached to a support and used to provide a point of attachment for blocks or ropes.


Tower-type bracket


Pole-type bracket

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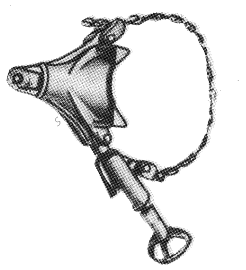
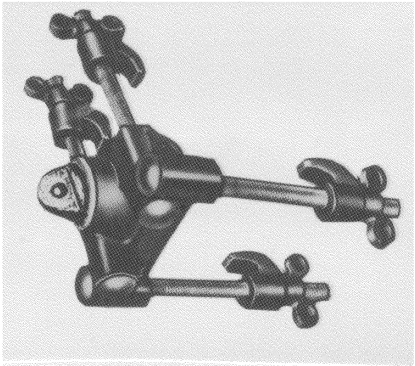
9.4.8 Saddle

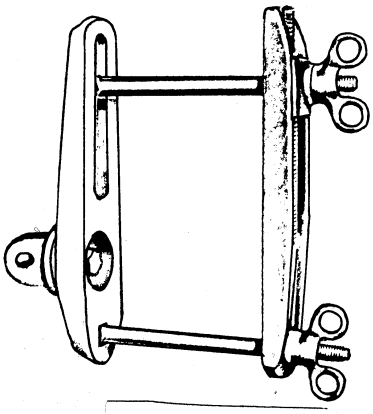
A metal accessory to hold or guide a wire support stick.



Pole-type saddle



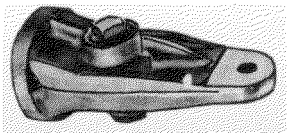
Tower-type saddle



Crossarm-type saddle

9.4.9 Saddle Extension

Used with a stick saddle to increase clearance.



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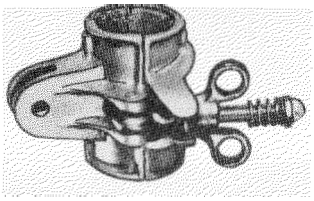
9.4.10 Stick Clamp

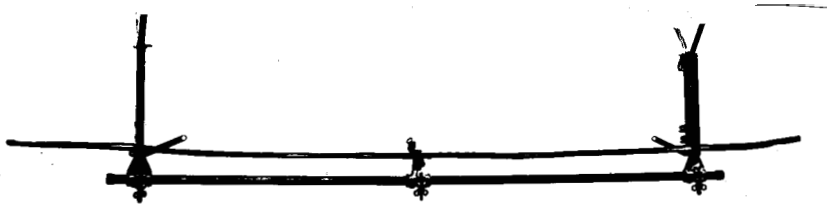
Used with a support stick or saddle to hold or guide a stick.



9.5 Miscellaneous

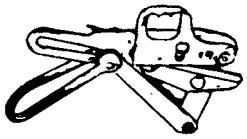
9.5.1 Antivibration Jumper Installing Tool

Composed of an insulating tube and metallic forks, is used with insulated ropes to handle an antivibration device.



9.5.2 Automatic Wire Grip

Used as an anchor on a conductor.



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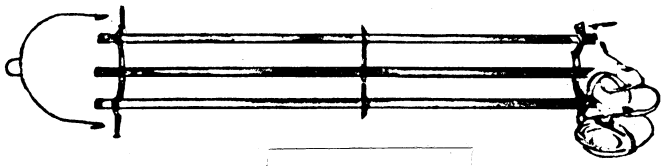
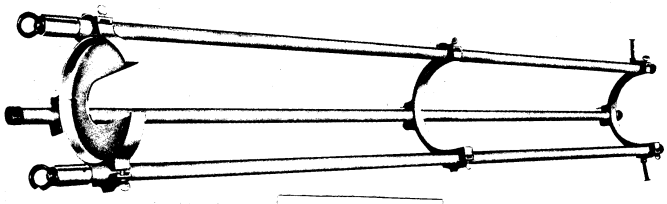
9.5.3 Insulator Cradle

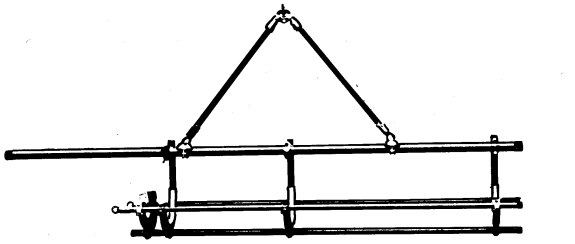
Constructed of insulating tubes to facilitate the handling of an insulator string.



Combination cradle



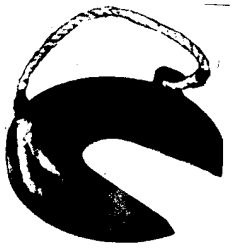
Standard cradle



Side-opening cradle

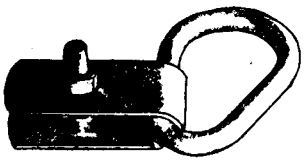
9.5.4 Insulator Fork

A synthetic or metal tool used to handle an insulator string.



9.5.5 Offset Eye

Used to provide a rigging eye when attached to the butt-ring of a stick.



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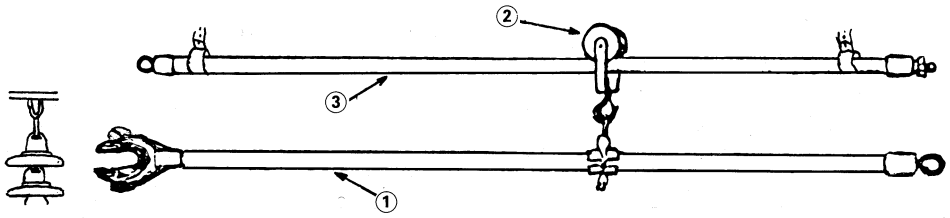
9.5.6 Trolley Stick Assembly

Assembly of sticks, used to position and remove suspension insulators.



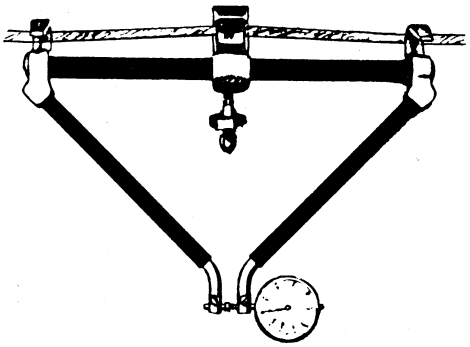
① Insulator-fork pole (stick)
② Trolley wheel
③ Trolley pole (stick)

10. Measuring and Testing Equipment

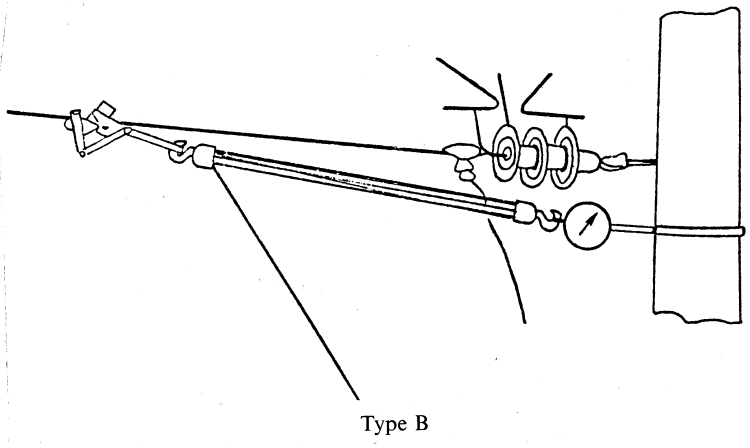
10.1 Mechanical Measurements

10.1.1 Dynamometer

Used to measure the mechanical tension or variation of mechanical tension of a wire, in using calculator or conversion table.



Type A



Type B

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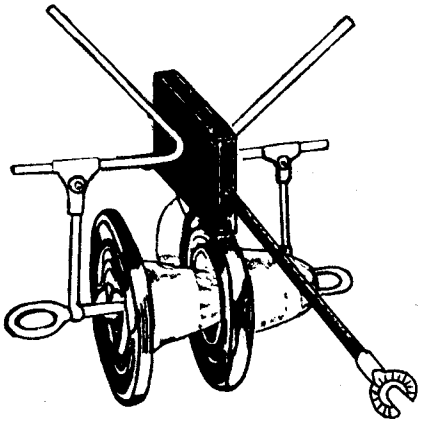
10.1.2 Gap Gauge

Made of insulating material and fitted to a universal hand stick to check and set the gap clearance of arcing horns.



10.1.3 Measuring Pole or Stick

An insulating pole or stick used to measure lengths or clearances.



10.1.4 Wire Gauge

A universal hand-tool attachment used to measure the diameter of a wire.



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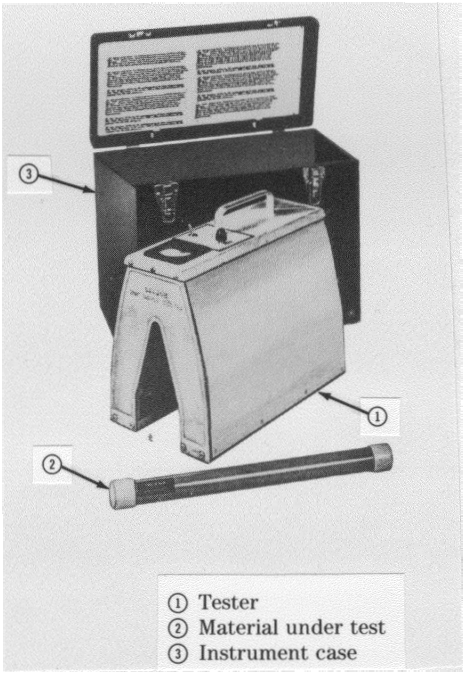
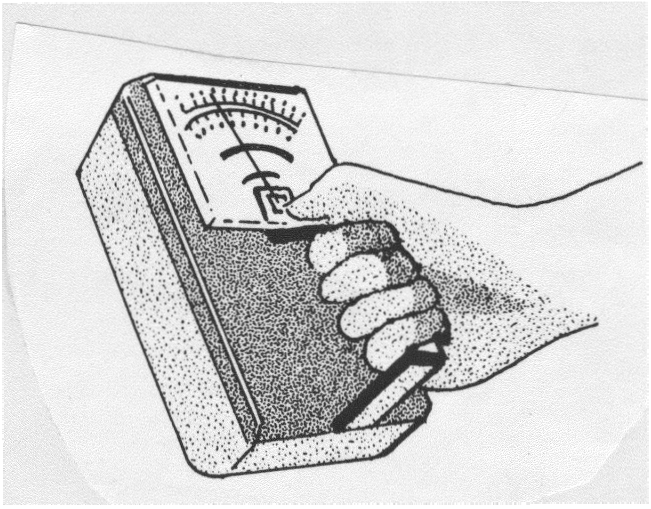
10.2 Electrical Measurements

10.2.1 Live Line Tool Testers

Used to check conductivity of insulating tools and materials.





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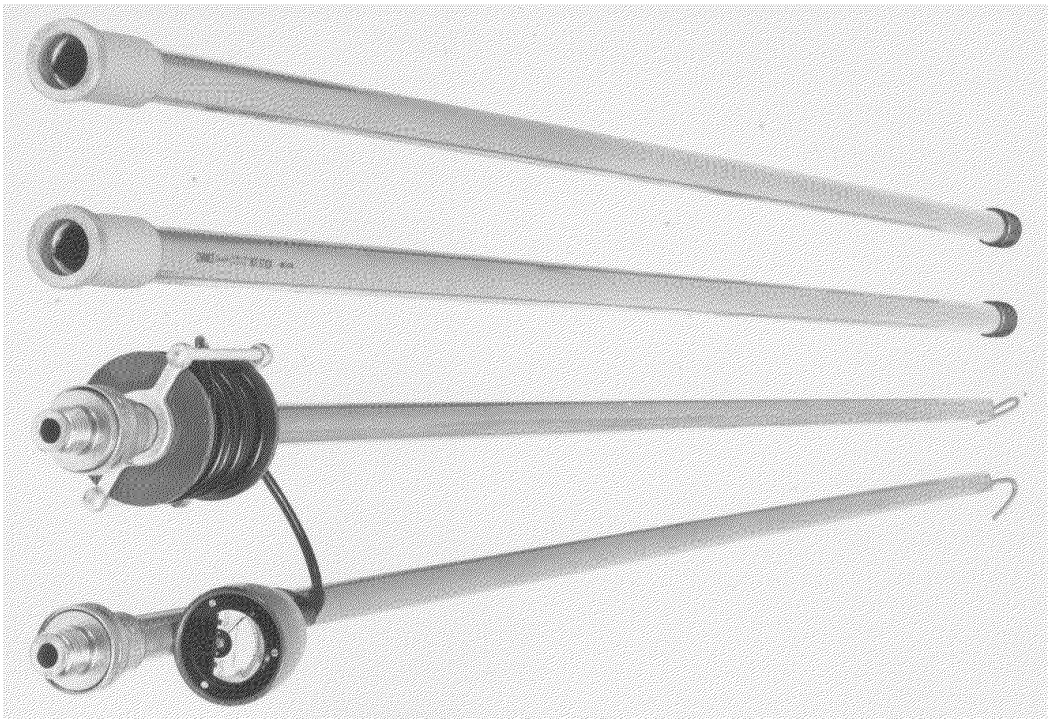
10.2.2 Phasing Tester

Attached to universal hand stick, used to check phasing and voltage.



10.2.3 Voltage Detector

Used to detect the presence or absence of line voltage.



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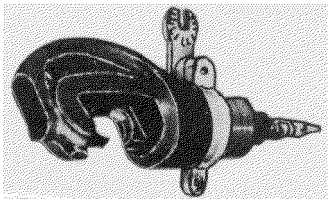
11. Hydraulic and Miscellaneous Equipment

11.1 Hydraulic Equipment

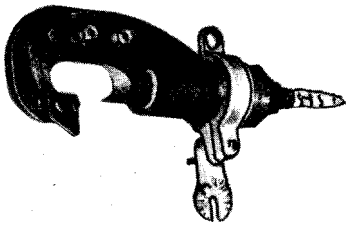
11.1.1 Hydraulic Compression Head

Used to compress various sleeves and connectors.



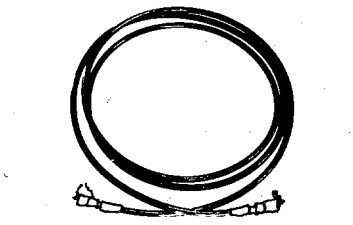
11.1.2 Hydraulic Cutter Head.

Used to cut wires when operated by a hydraulic pump.



11.1.3 Hydraulic Hose

Flexible hose for hydraulic equipment.



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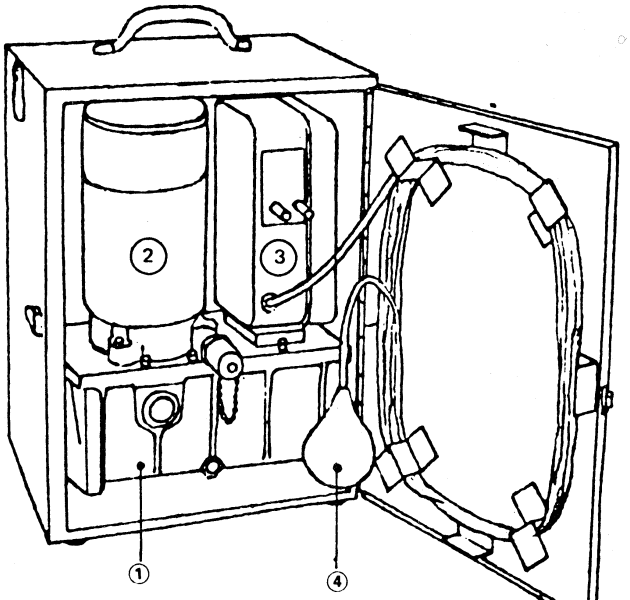
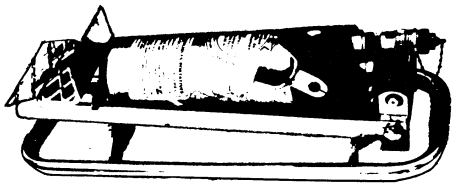
11.1.4 Hydraulic Pump

Used to generate hydraulic pressure for appropriate tools.



① Oil reservoir
② Motor pump
③ Connection box
④ Operating bulb

Electric motor pump

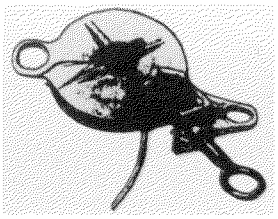


Foot pump

11.2 Miscellaneous Equipment

11.2.1 Armor Tape Winder

Used to apply metallic tape on wires.



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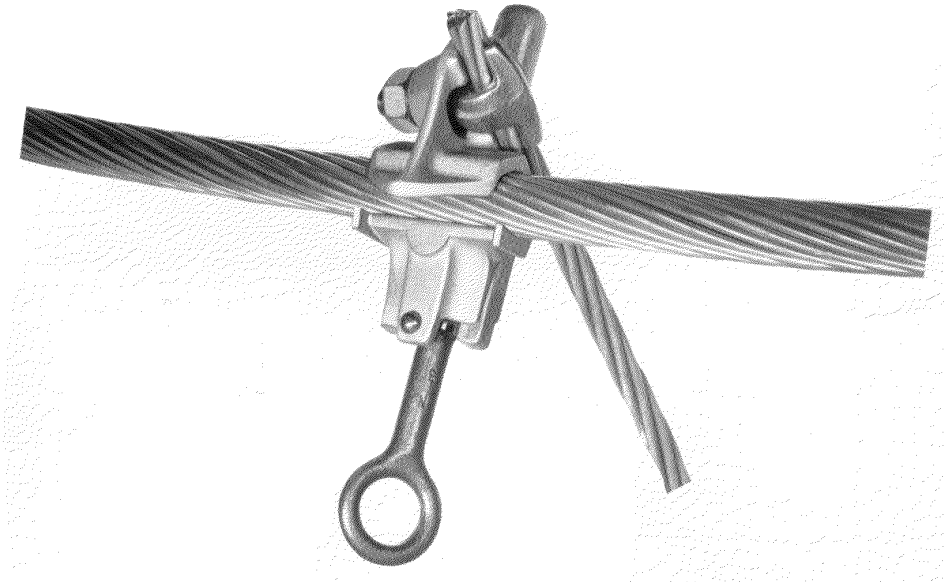
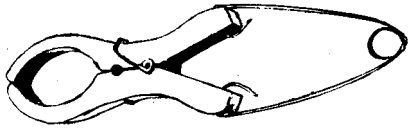
11.2.2 Hot Line Clamp

Used to connect a tap wire to a conductor.



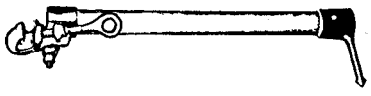
11.2.3 Insulating Blanket Clothes Pin

A clamp with a spring used to hold insulating blankets in position.



11.2.4 Insulating Hanger

A tube with a mechanical connector on one end and a metal hanger-bar on the other end, used temporarily when handling jumpers.



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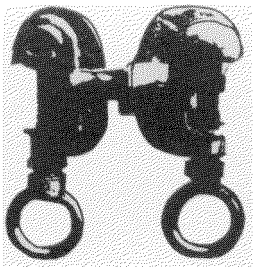
11.2.5 Tieback Connector

Used to secure the tail of a conductor.



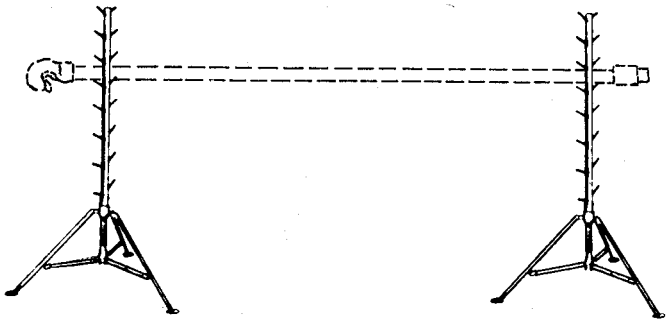
11.2.6 Tie Wire

Used to secure a wire to an insulator.



11.2.7 Tool Rack

Used to support poles in clear conditions.



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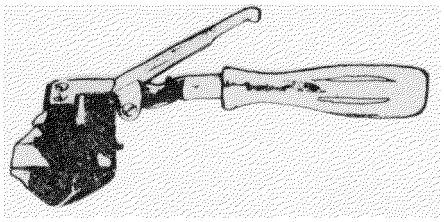
11.2.8 Wire Stripper

Used to strip insulation from conductors.



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