

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G53.100.1
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AT&T Co Standard

BLOCK AND HOUSE CABLE

ANCHORING DEVICES FOR ATTACHING

CABLES TO WALLS

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1. GENERAL

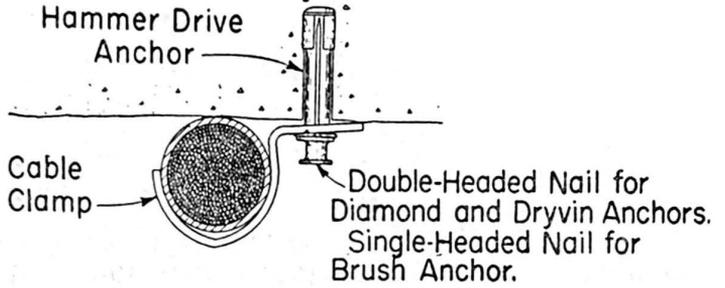
1.01 This section is issued to provide information regarding the various devices which experience has indicated to be satisfactory in attaching cables to walls, partitions and ceilings.

1.02 This section together with others in the series replaces Sections G10.375 and G10.380.

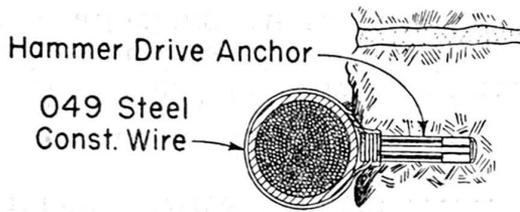
2. ATTACHMENTS TO BUILDING SURFACES

2.01 Cables shall be attached to walls and ceilings as illustrated below:

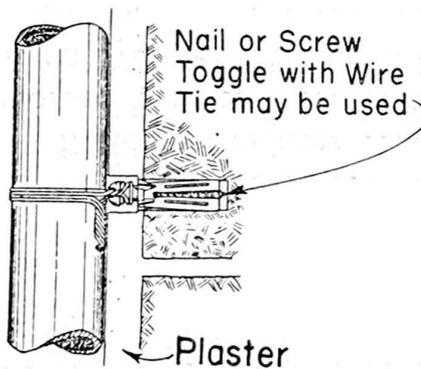
MASONRY-FINISHED SURFACE



MASONRY-UNFINISHED SURFACE



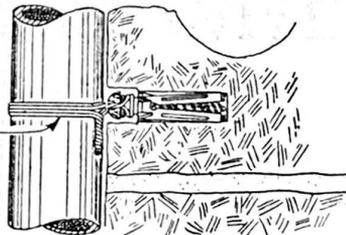
PLASTER ON PLASTER BLOCK



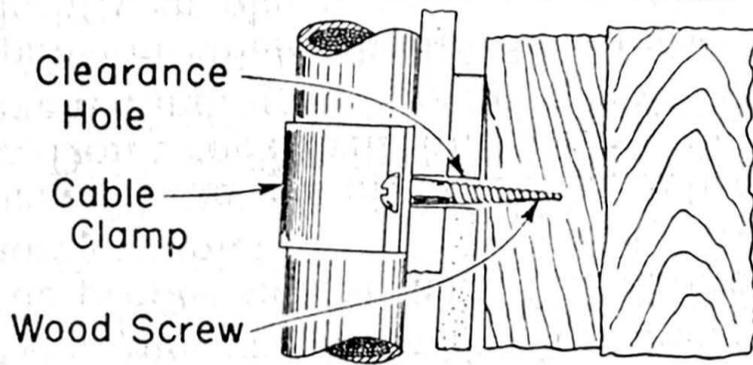
PLASTER BLOCK

Place screw with wire Tie in Anchor. Insert Anchor in hole and expand by turning screw.

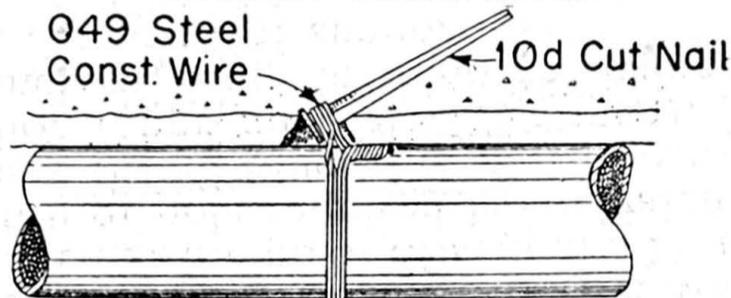
Drill hole in Plaster Block with a Twist Drill of the O.D. indicated on the Expansion Shield.



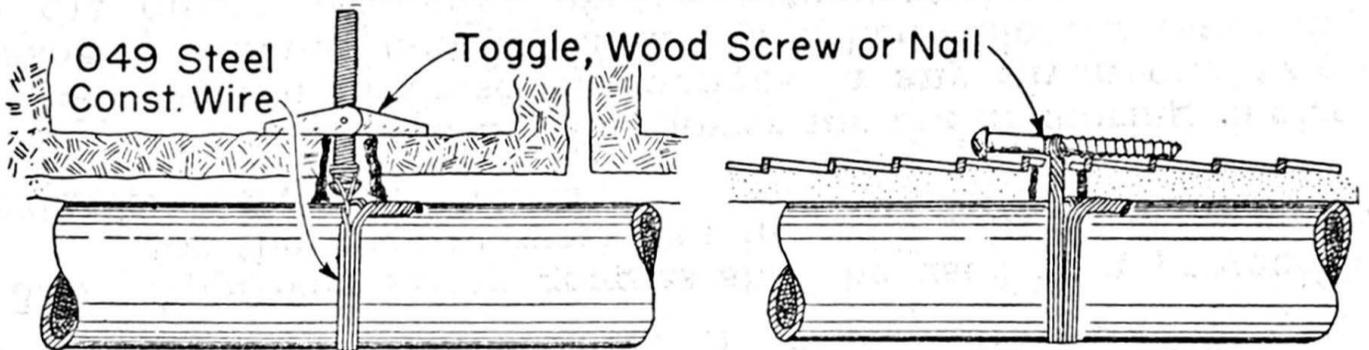
RIGID COMPOSITION SHINGLE



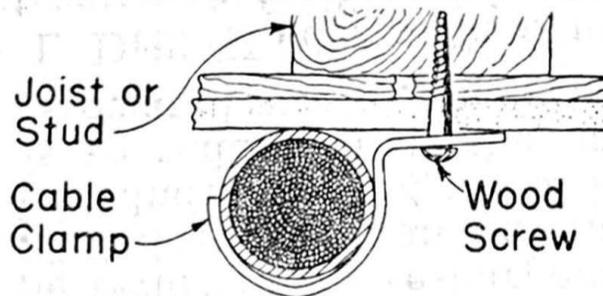
CINDER CONCRETE



HOLLOW TILE OR METAL LATH



LATH AND PLASTER OR PLASTER BOARD



3. TYPES OF ANCHORING DEVICES

3.01 The standard anchoring devices include Hammer Drive Anchors, Screw Anchors, Machine Bolt Anchors and Screws or Nails with Wire Ties. Short masonry drills of six sizes ranging from 3/16 inch to 1/2 inch in multiples of 1/16

inch are to be used in installing the anchoring devices in masonry including hollow tiles. The 1/2 inch size may be used in placing 1/8 inch Toggle Bolts. For larger sizes of toggle bolts a drill of proper type and size indicated in Paragraph 3.07 should be selected. The sizes of Short Masonry Drills agree with the sizes of anchors with which they should be used. The actual diameters provide the required clearance for installation. Drills should be returned for resharpenering as soon as the cutting edges are dulled to such an extent that the cutting action is appreciably reduced. Do not use a drill after the diameter of the point is so reduced that the drilled hole will not accommodate the associated size of anchor.

3.02 The Type L Drill Holder with a molded rubber grip and an extractor to facilitate the removal of the drill is available for hand drilling. However, when a large number of holes are to be drilled power operated tools, if available, may be used to advantage provided that permission to use them is obtained from the property owner or his representative.

3.03 Approved safety goggles shall be used as a protection for the eyes of workmen in drilling holes in masonry surfaces.

3.04 The maximum holding power for the anchoring devices covered in these instructions in any given quality of masonry, depends upon obtaining a drilled hole corresponding to the outside diameter of the unexpanded anchor and of sufficient depth to allow the nail to be driven its full length. The diameter and length are generally indicated on the anchor. The depth of hole required varies with the thickness of the fixture to be installed at the point of support. In all installations, the minimum depth of hole required is equivalent to the length of the anchor plus the distance the nail or screw will extend beyond the anchor (approximately 3/16 inch). In the case of hammer drive anchors, keep in mind to deduct the thickness of the fixture at the point of support.

3.05 The following points should be observed in using an anchoring device:

- (a) Select type and size of anchoring device specified.
- (b) Select the proper size of drill. The diameter is indicated on the anchor shield.
- (c) Drill masonry to required depth with light taps of hammer. Don't rock drill, but turn it slightly after each blow to prevent binding.
- (d) The expansion shield should fit snugly for best results. Tap it lightly in place.

3.06 The three types of Hammer Drive Anchors, the Screw Anchor and the Machine Bolt Anchor, in general use, are shown in the following illustrations.

HAMMER DRIVE ANCHORS

Dryvin Anchor

Expansion Shield



Nail
(Wedging Element)

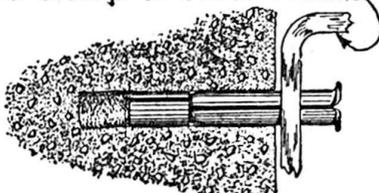
Diamond Hammer
Drive Anchor



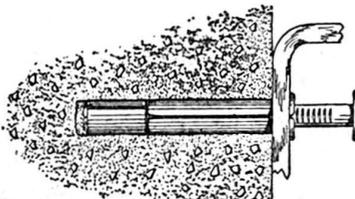
Brush Nail
Expansion Bolt



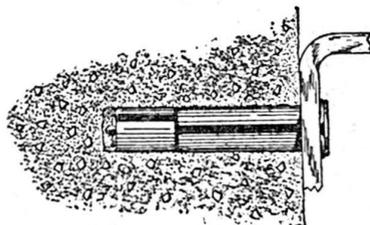
Cable Clamp or other fixture



Insert expansion shield through the mounting hole of fixture and into drilled hole.

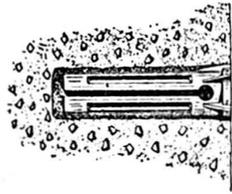


Tap expansion shield lightly until the flange rests against the fixture, then insert nail into the expansion shield.



Drive nail in until the head seats firmly.

SCREW ANCHOR



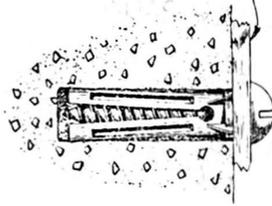
Insert expansion shield into the drilled hole tapping it lightly until the head is flush with the mounting surface.



Expansion Shield

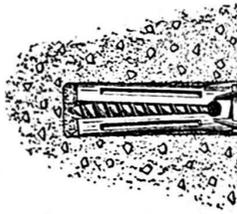


Wood Screw
(Wedging Element)



Fixture

Insert screw through mounting hole of fixture into the expansion shield and turn it down until the head seats firmly.



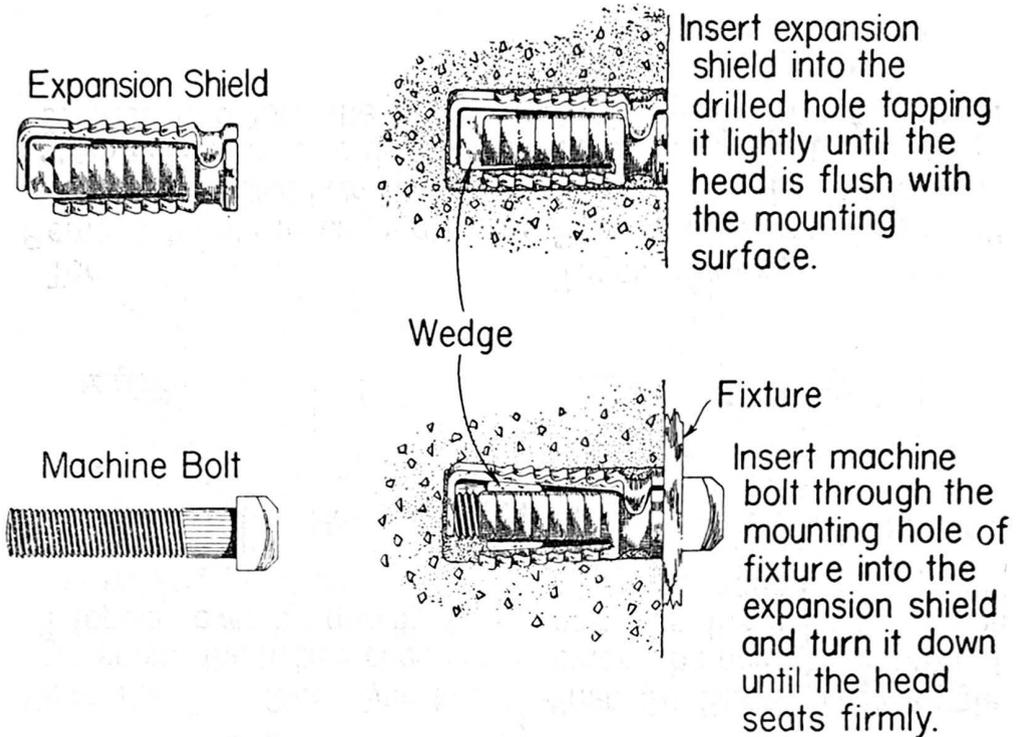
Bridle Ring
(Wood Screw Thread)

REVERSE SIDE VIEWS

FOR INFORMATION OF THE USER, THE FOLLOWING INFORMATION IS PROVIDED FOR YOUR REFERENCE. THE INFORMATION IS NOT INTENDED TO BE USED AS A SUBSTITUTE FOR THE INSTRUCTIONS PROVIDED WITH THE PRODUCT.



MACHINE BOLT ANCHOR

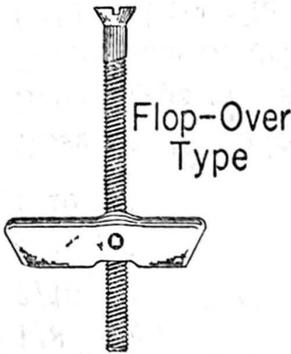


3.07 Toggle bolts are of two general types, Flop-Over and Spring. They are intended for use in attaching fixtures to hollow tile and similar supports. A secure toggle bolt installation depends on a satisfactory bearing area for the toggle. The hole should be restricted to the size that will accommodate the toggle in the collapsed condition. The table below lists the various sizes of Toggle Bolts and the diameter to which the drilled hole should be restricted for best results.

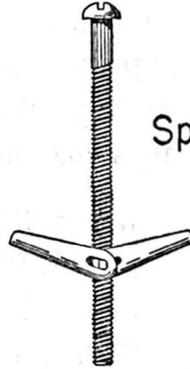
<u>Size of Toggle Bolt</u>	<u>Spread of Toggle</u>	<u>Dia. of Drilled Hole</u>
1/8 inch	2 inches	1/2 inch
3/16 "	2-1/4 "	5/8 "
1/4 "	2-1/2 "	3/4 "
5/16 "	2-3/4 "	7/8 "

- 3.08 Observe the following rules in installing Toggle Bolts:
- Select type and size of Toggle Bolt required.
 - Select size of drill in accordance with the above table.
 - Drill hollow tile by light taps with hammer, rotating drill slowly. If a rib is struck tilt drill toward hollow chamber. Use care to keep hole as small as possible.

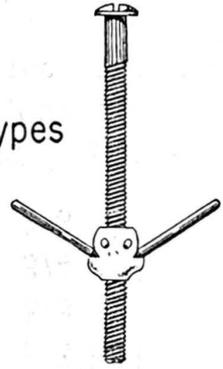
TOGGLE BOLTS



Flop-Over Type

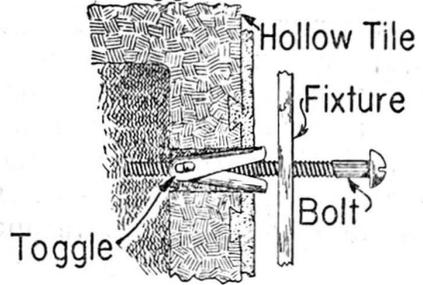
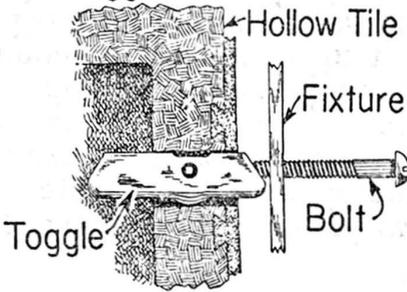


Spring Types



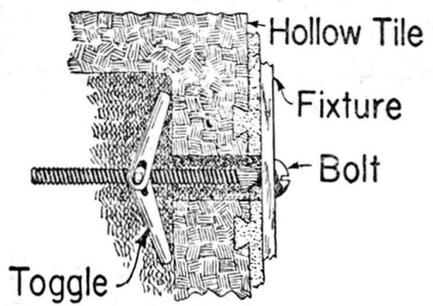
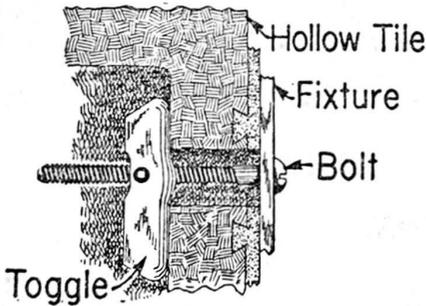
Installation of the Flop-Over Type Toggle Bolt

Installation of the Spring Type Toggle Bolt



When the Flop-Over Type toggle enters the hollow chamber it topples over by gravity to the holding position.

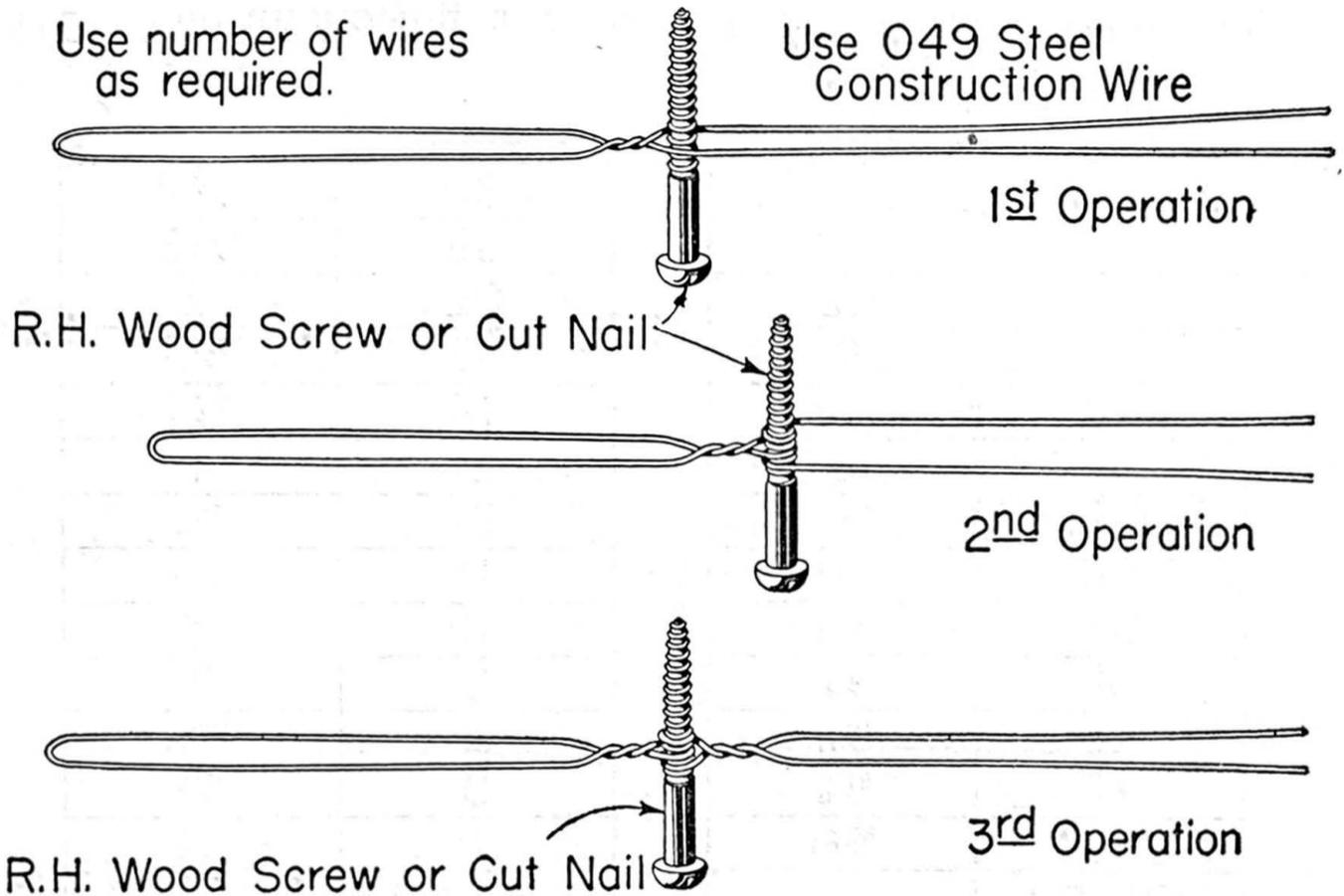
When the Spring Type toggle enters the hollow chamber it assumes the holding position by spring action.



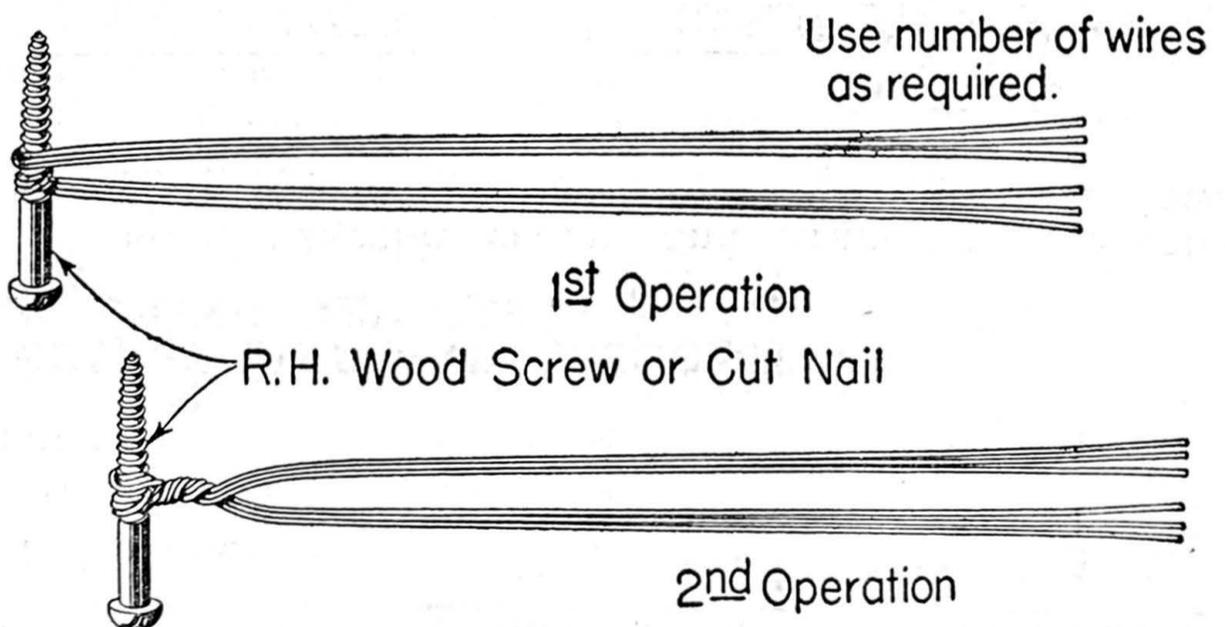
Remove toggle to engage fixture. Replace toggle and insert bolt through the drilled hole into the hollow chamber. After toggle has assumed the holding position draw it up against the bearing surface and turn the bolt down until the head seats firmly.

3.09 Where cable is supported by means of screws or nails with wire ties, the number of strands of wire required together with the type of screw or nail to be employed, is illustrated below.

WHERE NOT USED AS A TOGGLE



WHERE USED AS A TOGGLE



Where toggle bolts are used with wire ties for supporting cable on hollow tile surfaces the wire ties should be attached to the bolt as illustrated above.

The number of wires for ties to be used with different sizes of cable are shown in the following table:

<u>Size of Cable</u>	<u>No. of Wires for a Straight Tie</u>	<u>No. of Wires for a Splice</u>
Less than 2 pounds	2	3
2 pounds to 4 pounds	3	4
Over 4 pounds	4	4

4. CLAMPS, STRAPS AND ASSOCIATED ANCHORING DEVICES

4.01 The standard cable clamps and straps and the cable diameters with which they can be used are as follows.

CABLE CLAMPS	
Cable Diameter	Cable Clamp Number
$\frac{5}{16}$	4
$\frac{3}{8}$	6
$\frac{15}{32}$	7
$\frac{1}{2}$	8
$\frac{9}{16}$	9
$1\frac{1}{16}$	11
$\frac{7}{8}$	13
1	17
$1\frac{3}{8}$	21
$1\frac{9}{16}$	25
2	30
$2\frac{5}{16}$	35
$2\frac{5}{8}$	42

CABLE STRAPS	
Cable Diameter	Cable Strap Number
$1\frac{3}{32}$	9
$\frac{9}{16}$	11
$1\frac{1}{16}$	13
$\frac{7}{8}$	16
$1\frac{1}{16}$	20
$1\frac{5}{16}$	24
$1\frac{5}{8}$	30
2	36
$2\frac{3}{8}$	42
3	56
$3\frac{1}{2}$	64

4.02 The anchoring devices to be used for fastening clamps and straps to various types of surfaces are as follows.

Cable Clamp Number	Cable Strap Number	Anchoring Devices			
		Masonry	Wood Drill $\frac{1}{16}$ in. lead hole for No. 8 Screw. Drill $\frac{1}{8}$ in. hole for No. 14 Screw and Strap Nail to avoid splitting.		Plaster on Wood Lath or Plaster Board
		Hammer Drive Anchor	*R. H. Wood Screw	** or Strap Nail	R. H. Blued Wood Screw
4		$\frac{3}{16}$ in. \times $\frac{7}{8}$ in.	1 in. No. 8	1- $\frac{1}{2}$ in.	1- $\frac{1}{2}$ in. No. 8
6		$\frac{3}{16}$ in. \times $\frac{7}{8}$ in.	1 in. No. 8	1- $\frac{1}{2}$ in.	1- $\frac{1}{2}$ in. No. 8
7		$\frac{3}{16}$ in. \times $\frac{7}{8}$ in.	1 in. No. 8	1- $\frac{1}{2}$ in.	1- $\frac{1}{2}$ in. No. 8
8		$\frac{3}{16}$ in. \times $\frac{7}{8}$ in.	1 in. No. 8	1- $\frac{1}{2}$ in.	1- $\frac{1}{2}$ in. No. 8
9	9	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
11	11	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
13	13	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	16	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
17		$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	20	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
21		$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	24	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
25		$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
30	30	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
35		$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	36	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
42	42	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	56	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14
	64	$\frac{1}{4}$ in. \times 1 in.	1- $\frac{1}{2}$ in. No. 14	2 in.	2 in. No. 14

* Use Galv. Wood Screws on the outside and Blued Wood Screws on the inside of buildings.

** Galv. Plaster Board Nail may be used if a thinner nail is required.

5. PLACING CABLE CLAMPS

5.01 **On brick walls**, place the anchor near the center of the brick with a minimum clearance of one inch between the anchor and the edges of the brick. When brick veneer is encountered the same method shall be followed, if secure attachment can be obtained and no cracking or loosening of bricks will result. Otherwise place anchor in the seam between bricks

if it will provide adequate anchoring. On stone walls, attach cable clamps in the same manner as for brick walls, except that anchors may be placed in the mortar seams between stones if a secure attachment can be obtained.

On woodwork, drill lead holes in order to avoid splitting the wood and to obtain maximum holding power. The sizes of twist drills to be used are:

3/32-inch Drill for 5/8-inch and 7/8-inch Drive Rings and No. 8 Wood Screws.

1/8-inch Drill for No. 14 Wood Screws.

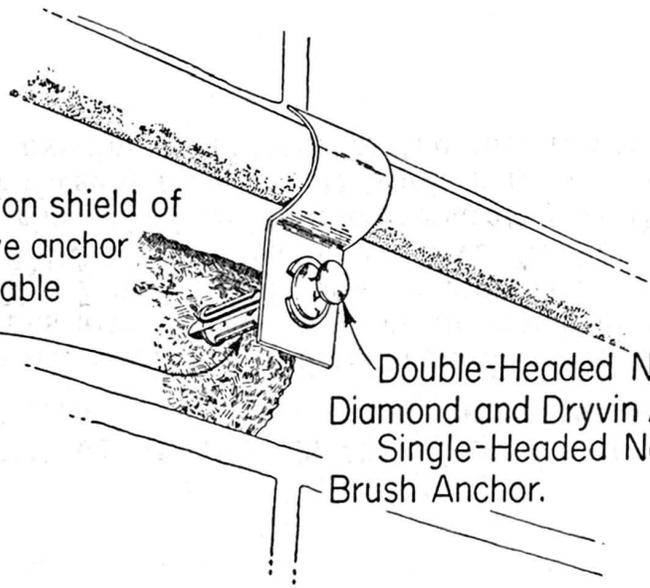
11/64-inch Drill for 1-1/4-inch Drive Ring.

In hollow tiles, if the holes can be drilled of such a size that the base of the clamp will have adequate bearing surface, use 3/16" x 4" Toggle Bolts. Otherwise, screws or nails with wire ties may be used as toggles.

On rigid composition shingles, because of their brittleness, the following precautions shall be observed.

- (a) Place ladder lightly against the shingles, preferably at points where the shingles overlap. If it is felt that additional precaution is necessary, secure a board across the top of the ladder.
- (b) Use only well sharpened drills.
- (c) Do not use drills which require the use of a hammer.
- (d) Do not apply excessive pressure when drilling holes.
- (e) Do not tighten wood screws excessively as the pressure on the shingle might cause it to break.
- (f) Always drill lead holes and use the twist drills specified above for woodwork.

5.02 The standard cable clamp is so designed that the base will generally form a slight angle with the mounting surface. Therefore, do not force the base flat against this surface. Install cable clamps attached to masonry with a hammer, drive anchor and a double headed nail to facilitate the extraction of the nail for drive ring installation, as shown below.

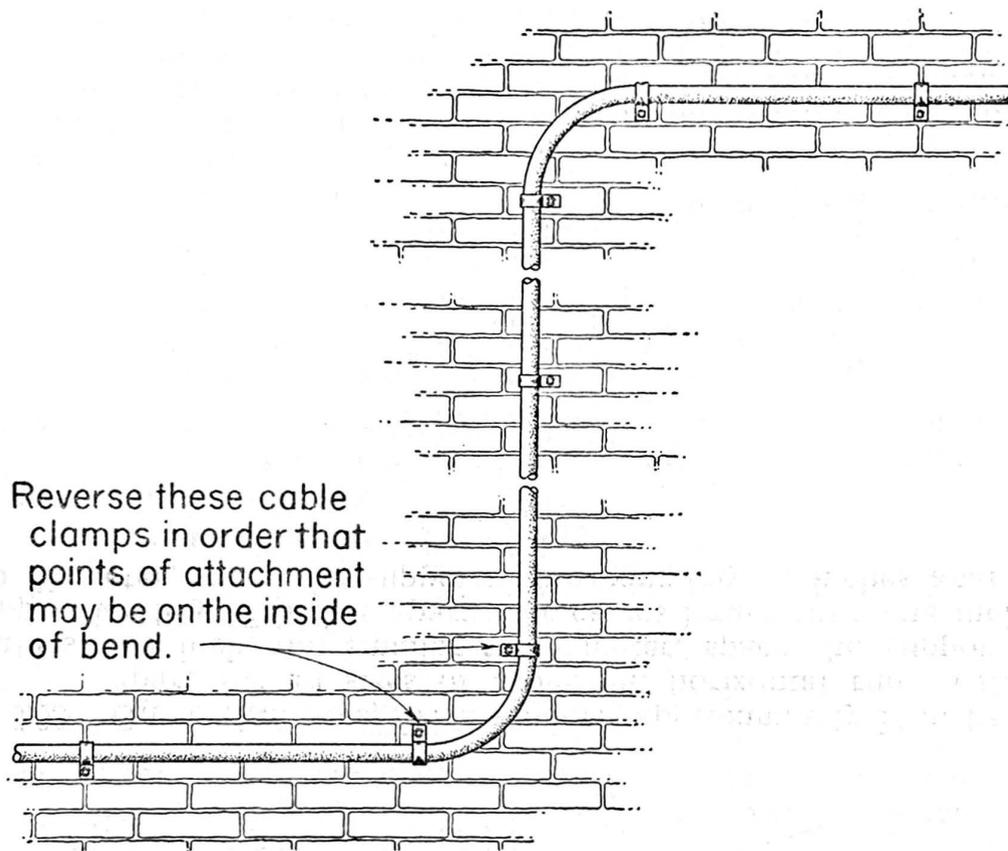


Insert expansion shield of
hammer drive anchor
into hole of cable
clamp.

Double-Headed Nail for
Diamond and Dryvin Anchors.
Single-Headed Nail for
Brush Anchor.

5.03 On vertical runs, space supports approximately 24 inches apart for all sizes of cable. On horizontal runs, with cables one inch and smaller in diameter, space the supports approximately 17 inches apart. For cables larger than one inch in diameter, space the supports approximately 26 inches apart.

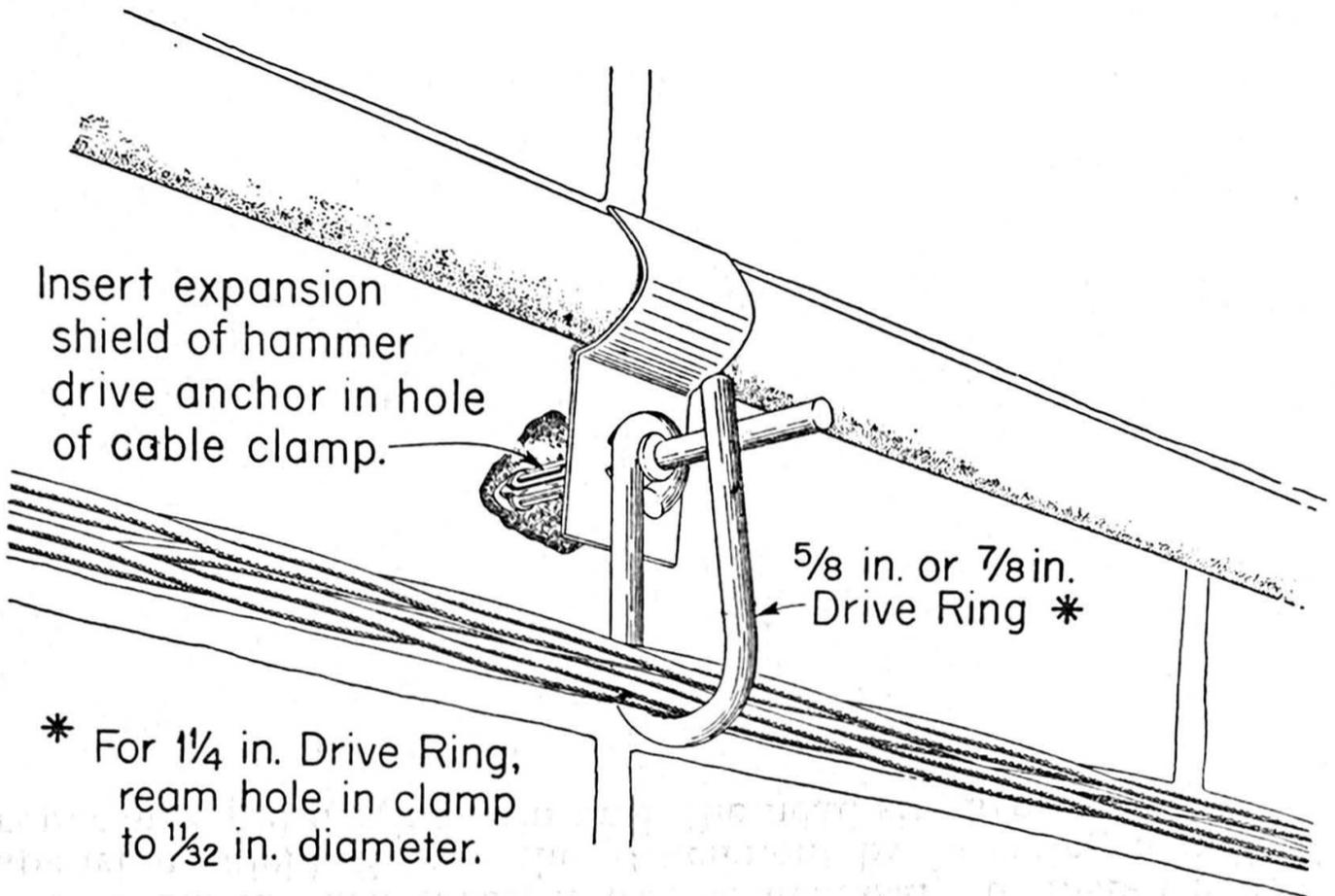
5.04 Locate cable clamps on a horizontal run so that the points of attachment are below the cable. Locate clamps of an adjacent vertical run so that the points of attachment are on the same side of the cable as those on the horizontal run, except at bends as shown below:



6. PLACING DRIVE RINGS IN CONJUNCTION WITH CABLE RUNS

6.01 Drive rings shall be used to support wires paralleling cable runs attached to masonry or wood, except when No. 4, No. 6, No. 7 and No. 8 cable clamps are attached to masonry with $3/16''$ x $7/8''$ Hammer Drive Anchors. In such cases the drive rings shall be installed separately as the anchor is too small for these drive rings. If bridle rings are to be used because of the existing conditions of the job, the work order

should specify them. An installation of a cable clamp and drive ring on masonry is shown below:



6.02 When placing clamps and drive rings in wood, lead holes shall be bored in order to avoid splitting the wood and to obtain maximum holding power. The sizes of twist drills to be used are:

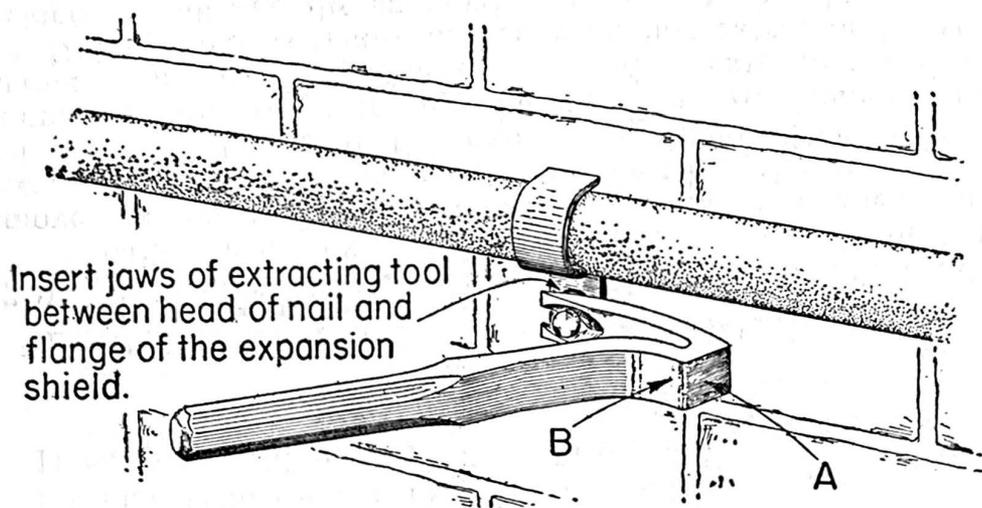
3/32-inch Drill for 5/8-inch and 7/8-inch Drive Rings and No. 8 Wood Screw.

1/8-inch Drill for No. 14 Wood Screw.

11/64-inch Drill for 1-1/4-inch Drive Ring.

7. REMOVING HAMMER DRIVE ANCHORS

7.01 To remove Hammer Drive Anchors with double headed nails insert extractor jaws between the heads. To remove Hammer Drive Anchors with single headed nails insert the jaws of an anchor extractor between the head of the nail and the flange of the expansion shield. Start nail by hammering anchor extractor in direction A. Remove nail further by means of light blows on head of extractor in direction B. After nail is removed, wedge anchor extractor between surface of wall and the supporting device and pry loose.



7.02 If it is desired to reuse the anchor and the drilled hole has retained the required cross-section the expansion shield, if a Diamond Hammer Drive Anchor or a Brush Nail Expansion Bolt, may be reinserted in the hole and the nail driven in tight. If it is a Dryvin Anchor that is to be reused, the soft metal collar will remain in the hole when the anchor is removed. In such cases, it will be necessary to install a new expansion shield. Secure the attachment by inserting a nail of proper size and driving it in until the head sits firmly.