BLOCK AND BUILDING CABLE HARDWARE AND ANCHORING DEVICES

CONTENTS PAGE

1. GENERAL

1.01 This section lists, illustrates, and categorizes the various types of hardware and anchoring devices used in block and house cable attachments. Actual field application of the hardware is described in 627-610-205.

1.02 This section is reissued to include addition of new hardware and anchoring devices, to delete obsolete anchoring methods and devices, and to incorporate all existing major hardware items now in the block and house cable practices. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

2. DEAD ENDING HARDWARE

2.01 ***S Guy Bolt (Fig. 1):*** The 5/8-inch S Guy Bolts are used in through-wall construction with 2.2M, 6M, and 6.6M strand. They are available in lengths from 8 through 18 inches in increments of 2 inches.

Fig. 1—S Guy Bolt

2.02 ***U Wall Strap (Fig. 2):*** Used for dead ending 2.2M, 6M, and 6.6M strand where an S Guy Bolt cannot be placed through a wall and where a secure anchorage can be obtained by means of two anchoring devices.

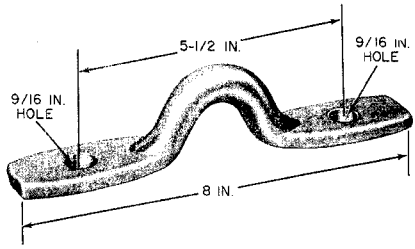


Fig. 2—U Wall Straps

2.03 ***Plate Wall Strap (Fig. 3):*** Used in lieu of the U Wall Strap where it is desirable to obtain a more secure anchorage.

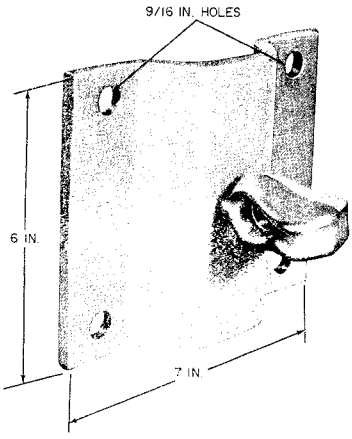


Fig. 3—Plate Wall Strap

*Reprinted to comply with modified final judgment.

2.04 ***Wall Straps (Fig. 4):*** The 1/2-inch wall strap is used for dead ending 2.2M strand on the side of a wall and the 5/8-inch wall strap is used with 6M and 6.6M strand.

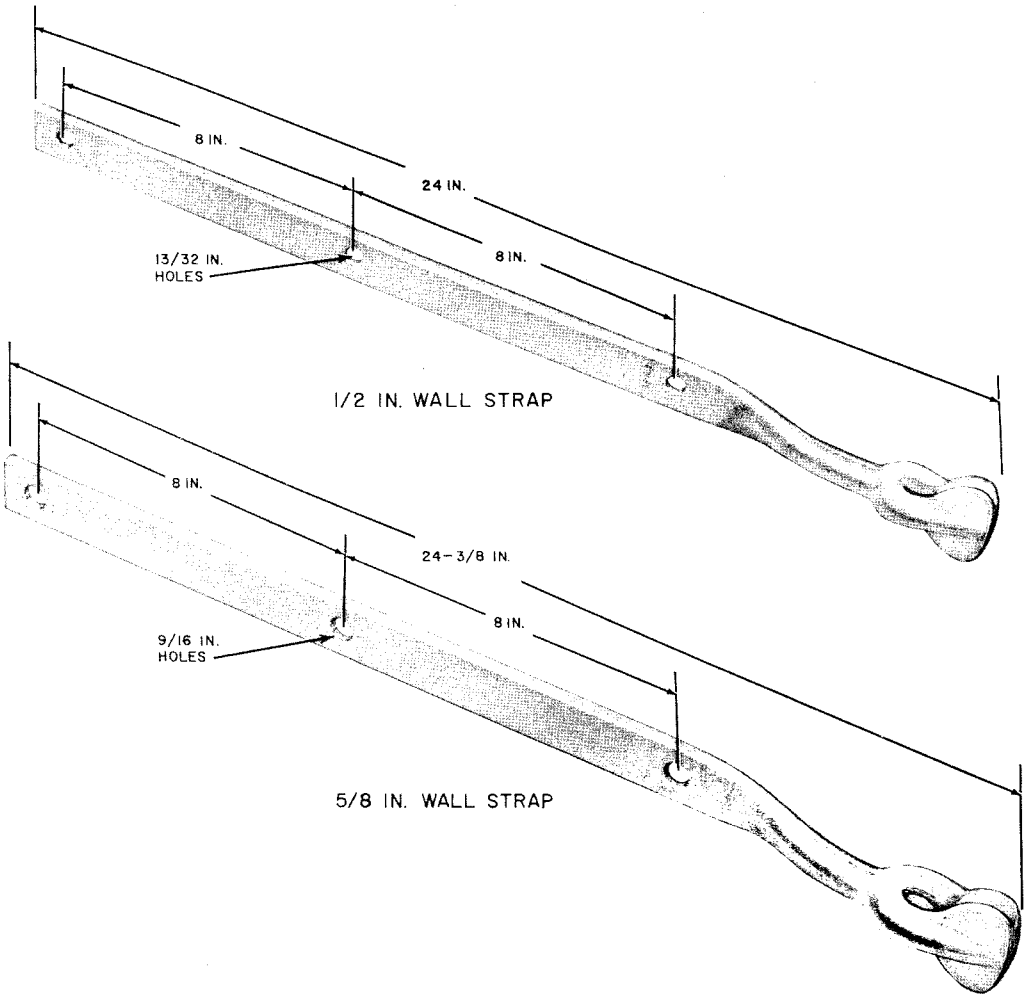


Fig. 4—Wall Strap

2.05 ***B Beam Clamp (Fig. 5):*** Used in conjunction with the 5/8-inch S Guy Bolt for dead ending strand on the flange of a structural steel member.

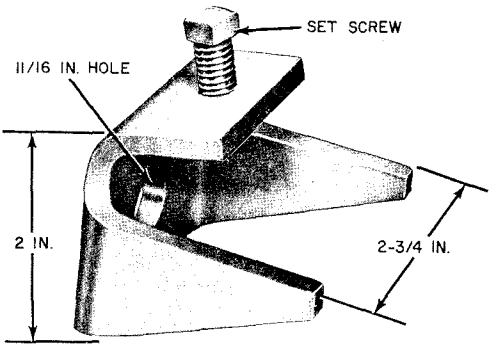


Fig. 5—B Beam Clamp

3. HARDWARE FOR INTERMEDIATE ATTACHMENTS

3.01 ***D Wall Bracket (Fig. 6):*** Used in conjunction with a 1-bolt guy clamp for supporting strand on exterior walls of either frame or masonry construction, where not more than 2 inches of clearance is required between cable and wall.

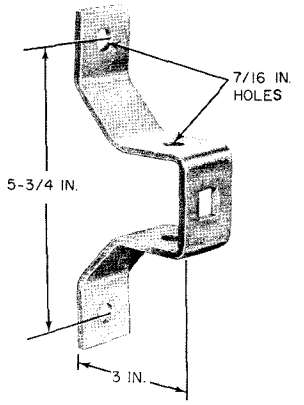


Fig. 6—D Wall Bracket

3.02 ***E Wall Bracket (Fig. 7):*** Used in lieu of the D Wall Bracket where more than 2 inches of clearance is required between cable and wall. This bracket will provide a maximum clearance of 7 inches.

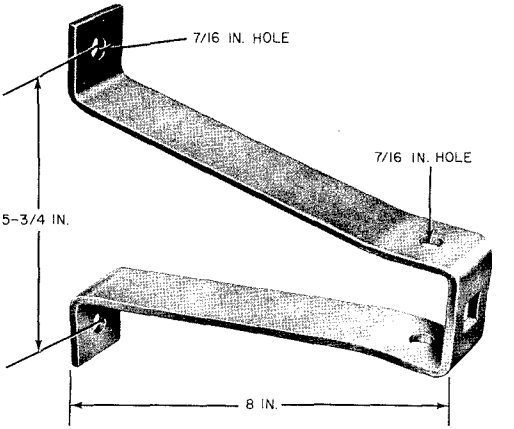


Fig. 7—E Wall Bracket

3.03 ***S Wall Bracket (Fig. 8):*** Used for supporting strand on interior walls of either frame or masonry construction where not more than 2 inches of clearance is required between cable and wall.

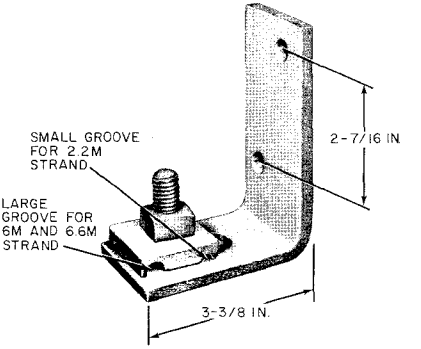


Fig. 8—S Wall Bracket

3.04 ***L Wall Bracket (Fig. 9):*** Used in lieu of S Wall Bracket where more than 2 inches of clearance is required between cable and wall. This bracket will provide a maximum clearance of 5 inches.

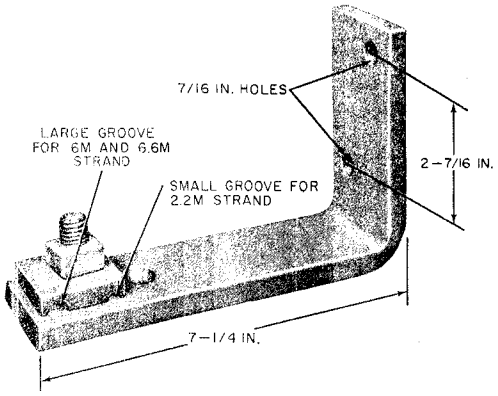


Fig. 9—L Wall Bracket

3.05 *B Corner Wall Strap (Fig. 10):* Used for spanning between buildings, or between a pole and building, to bring cable supporting strand in line with the building wall where an offset not exceeding 10 degrees exists. It is for use on either masonry or frame construction. The clevis end of the strap accommodates the sheathed strand of self-supporting cable.

3.06 Fig. 11 shows the method for determining the change in grade of a building attachment. After determining the change of grade in degrees, either horizontally or vertically, refer to 3.05 and 3.07 for choice of proper hardware item.

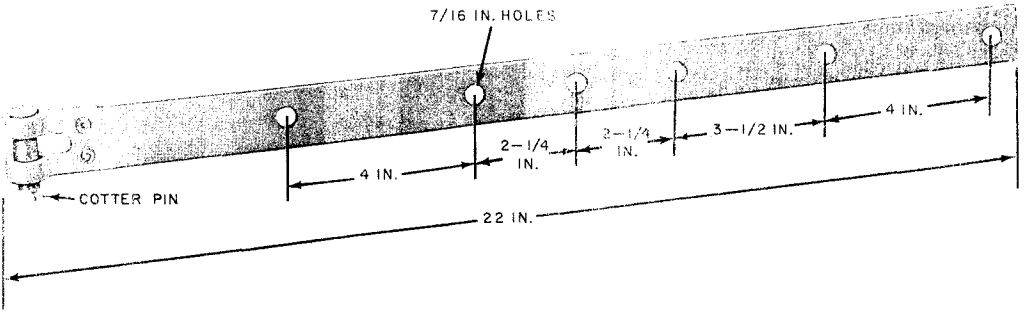
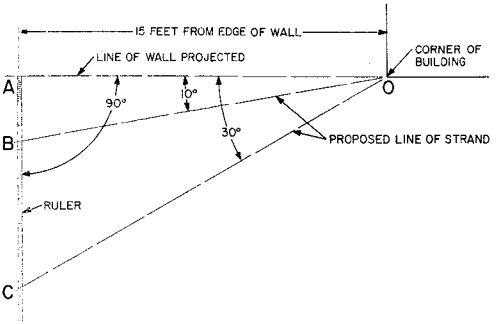


Fig. 10— B Corner Wall Strap



LAY RULE AT RIGHT ANGLE (90°) TO LINE AO AT POINT A. IF DISTANCE AB IS LESS THAN 30 INCHES, USE CORNER WALL STRAP. IF GREATER THAN 30 INCHES BUT NOT IN EXCESS OF 90 INCHES, THE C WALL BRACKET SHALL BE USED. IF OVER 90 INCHES, DEAD END SUSPENSION STRAND.

Fig. 11—Method for Determining Change in Grade

3.07 *C Wall Bracket (Fig. 12):* Used in lieu of the B Corner Wall Strap where the change in direction of the strand, either horizontally or vertically, will be greater than 10 degrees but not more than 30 degrees. Determine these angles by referring to Fig. 11.

3.08 *B Wall Bracket (Fig. 13):* Used for placing strand at outside corners on masonry buildings. The clevis end of the bracket accommodates the sheathed strand of self-supporting cable.

3.09 *C Beam Clamp (Fig. 14):* Used for intermediate attachments of strand to the flange of a structural steel member.

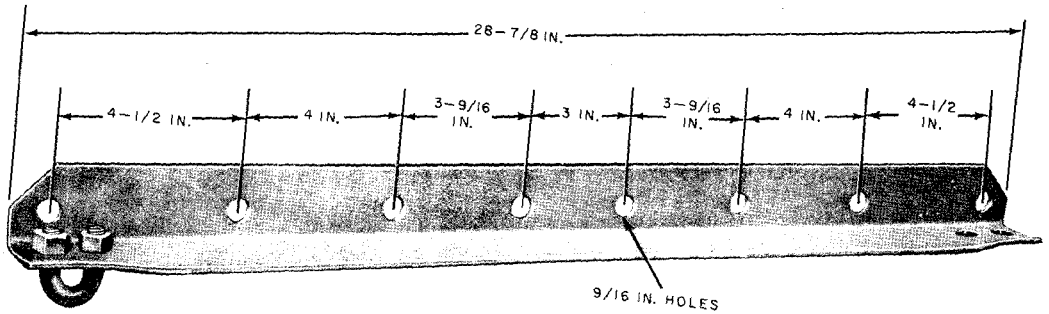


Fig. 12—C Wall Bracket

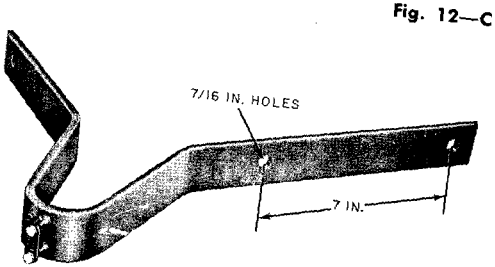


Fig. 13—B Wall Bracket

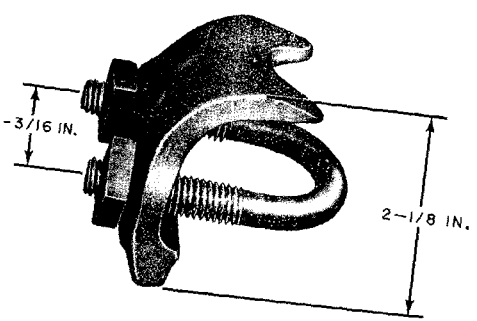


Fig. 14—C Beam Clamp

3.10 ***Insulator Support (Fig. 15):*** Used in conjunction with cable clamps and one-bolt guy clamps for attaching to structural steel members.

3.11 ***B Support Clip (Fig. 16):*** Used as a support when attaching to structural steel members.

3.12 ***Plastic Cable Support (Fig. 17):*** Used for attaching building cable directly to parallel runs of power conduit or cold water pipes suspended from ceilings or walls.

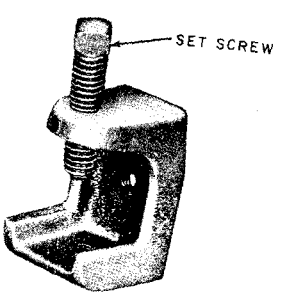


Fig. 15—Insulator Support

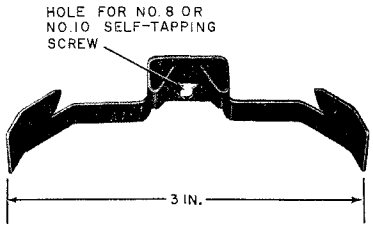


Fig. 16—B Support Clip

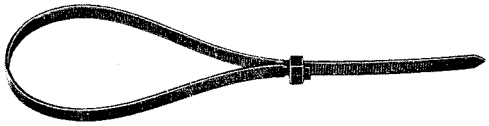


Fig. 17—Plastic Cable Support

4. HARDWARE FOR ATTACHING DIRECTLY TO WALLS

4.01 ***Cable Clamp (Fig. 18):*** Cable clamps may be used on any type of wall surface where direct cable attachment is desired. For selecting correct size of clamp, refer to Fig. 18.

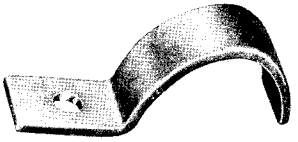
4.02 ***C Leader Bracket (Fig. 19):*** Used along cable runs attached directly to walls where it is necessary to clear an intermediate obstruction, eg, down spout, water pipe, etc. This bracket will provide up to 5 inches of clearance.

5. ANCHORING DEVICES

GENERAL

5.01 The maximum holding power for an anchoring device is attained when the drilled hole corresponds to the outside diameter of the unexpanded anchor and allows sufficient depth for the nail, screw, or bolt to be inserted its full length. The depth of the hole required varies with the thickness of the fixture to be installed at the point of support. Be sure to deduct the thickness of the supporting fixture. The minimum depth of the hole required is equivalent to the length of the anchor plus the distance that the nail, screw, or bolt will extend beyond the anchor (approximately 3/16 inch).

Caution: Approved eye protection, as described in 081-020-011, must be worn by craftsmen when drilling holes.



CABLE CLAMPS		
CABLE CLAMP NUMBER	CABLE DIAMETER	
	MINIMUM	MAXIMUM
4	.25	.33
6	.34	.43
7	.44	.52
8	.53	.60
9	.40	.59
10	.61	.72
11	.60	.72
13	.73	.93
17	.94	1.20
21	1.21	1.45
25	1.46	1.70
30	1.71	2.00
35	2.01	2.40
42	2.41	2.70

Fig. 18—Cable Clamp

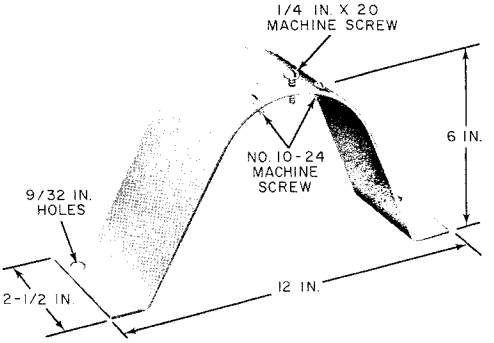


Fig. 19—C Leader Bracket

5.02 ***Brick, Brick Veneer, or Stone Walls:*** Place the anchor near the center of the brick, maintaining a minimum distance of 1 inch between the anchor and the end of the brick. On brick veneer walls, the same method must be followed if secure attachment can be obtained and no cracking or loosening of bricks will result. Otherwise, place anchor in the horizontal mortar seam between bricks if it will provide secure 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.

5.03 ***In Hollow Tile:*** If holes can be drilled of such size that the toggle will have adequate bearing surface, use toggle bolts. Otherwise, screws or nails with wire ties may be used as toggles. Drill hollow tile by light taps with hammer, rotating drill slowly. If a rib is struck, tilt drill toward cavity in tile. Use care to keep hole as small as possible.

5.04 ***Woodwork:*** Drill lead holes in order to avoid splitting the wood and to obtain maximum holding power.

5.05 ***Rigid Composition Shingles:*** Because of their brittleness, the following precautions must be observed:

(a) Place ladder lightly against the shingles, preferably at points where the shingles overlap. If 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 a break.

(f) Always drill lead holes.

TYPES AND DESCRIPTIONS

5.06 For determining the proper type of anchoring device to be used, consider the kind of wall surface, composition of the wall or ceiling, and the type of hardware to be attached. The standard anchoring devices consist of B Drive Anchors, B and C Masonry Fasteners, B and C Plastic Anchors, Machine Bolt Anchors, B Wall Screw Anchors, and Toggle Bolts.

5.07 ***B Drive Anchor (Fig. 20):*** Used for making attachments to masonry. It consists of a steel or aluminum shield and a steel nail and is available in 15 sizes as shown in Table A. A predrilled hole is required corresponding to the size of the unexpanded shield.

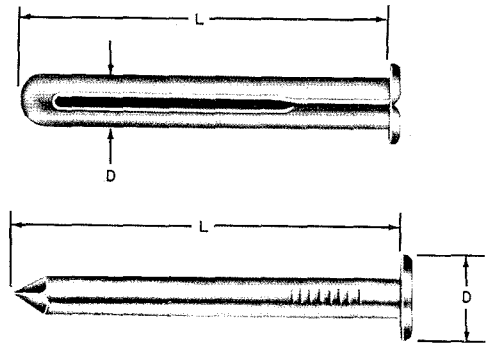


Fig. 20—B Drive Anchor

TABLE A

B DRIVE ANCHOR

ANCHOR SIZE	SHIELD DIAMETER AND LENGTH (IN.)	NAIL DIAMETER AND LENGTH (IN.)
3/16x7/8	3/16x7/8	5/16x1-1/16
3/16x1-1/4	3/16x1-1/4	5/16x1-7/16
1/4x1	1/4x1	3/8x1-5/16
1/4x1-1/4	1/4x1-1/4	3/8x1-9/16
1/4x1-1/2	1/4x1-1/2	3/8x1-13/16
5/16x1-1/4	5/16x1-1/4	7/16x1-5/8
5/16x1-3/4	5/16x1-3/4	7/16x2-1/8
5/16x2-1/4	5/16x2-1/4	7/16x2-5/8
5/16x2-3/4	5/16x2-3/4	7/16x3-3/16
3/8x1-1/2	3/8x1-1/2	1/2x1-15/16
3/8x2	3/8x2	1/2x2-7/16
3/8x3-1/4	3/8x3-1/4	1/2x3-5/8
1/2x2-1/4	1/2x2-1/4	5/8x2-3/4
1/2x2-3/4	1/2x2-3/4	5/8x3-3/16
1/2x3-1/2	1/2x3-1/2	5/8x3-15/16

5.08 ***Masonry Fasteners (Fig. 21):*** The B and C Masonry Fasteners are made of heat-treated steel and are used for making attachments to masonry surfaces. They are driven directly into masonry by means of a hand-operated masonry drive tool or the B Stud Driver. The description and operation of the hand-operated drive tool are covered in Section 080-123-101. The description and operation of the B Stud Driver are covered in 075-130-301. The B and C Masonry Fasteners are available in various lengths as designated by the size number in Table B.

5.09 Observe the following considerations when installing fasteners:

- For soft materials a long fastener is used; for hard materials a short fastener is used.
- On brick construction, fasteners should be driven into horizontal seams.
- Do not use fasteners on brittle material such as tile.

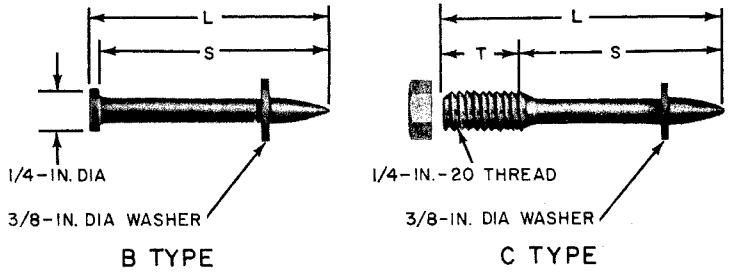


Fig. 21—Masonry Fasteners

TABLE B

B AND C MASONRY FASTENERS

B MASONRY FASTENER				C MASONRY FASTENER		
SIZE NO.	LENGTH (IN.)		SIZE NO.	LENGTH (IN.)		
	SHANK (S)	NOMINAL (L)		SHANK (S)	NOMINAL (L)	THREADED (T)
2	1/2	9/16	31	3/4	1	1/4
3	3/4	13/16	32	3/4	1-1/4	1/2
4	1	1-1/16	35	3/4	2	1-1/4
5	1-1/4	1-5/16	41	1	1-1/4	1/4
6	1-1/2	1-9/16	42	1	1-1/2	1/2
8	2	2-1/16	45	1	2-1/4	1-1/4
10	2-1/2	2-9/16	51	1-1/4	1-1/2	1/4
12	3	3-1/16	52	1-1/4	1-3/4	1/2
			55	1-1/4	2-1/2	1-1/4

5.10 ***B and C Plastic Anchors (Fig. 22):*** Suitable for use on any type of interior wall construction. They consist of a molded plastic body and a steel nail which has a slotted head and a threaded shank to aid in removal. The available sizes are shown in Table C.

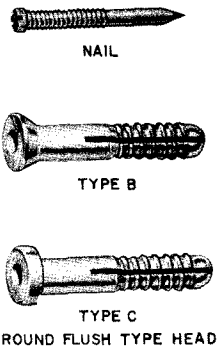


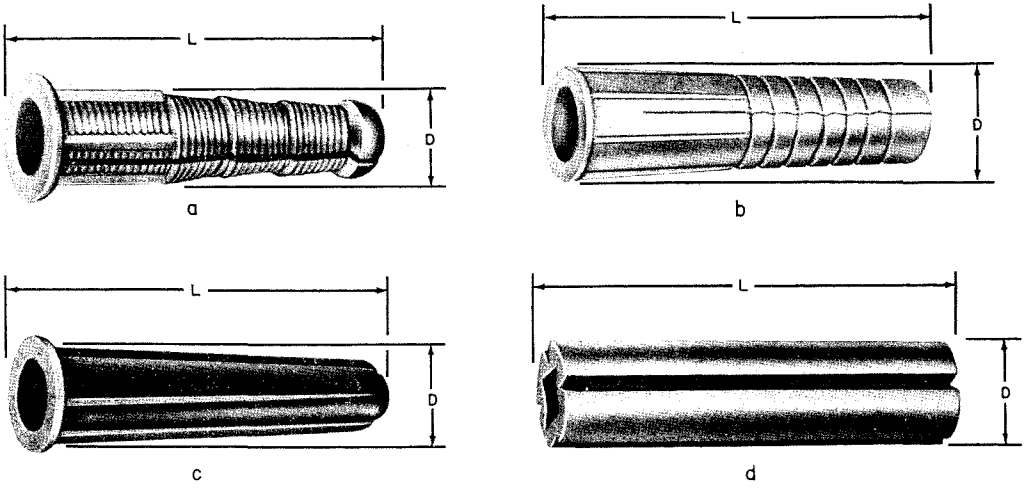
Fig. 22—C Plastic Anchor

TABLE C

B AND C PLASTIC ANCHORS

SIZE	TYPE OF HEAD	DIMENSIONS (IN.)	
		DIAMETER	LENGTH
B PLASTIC ANCHOR			
3/16x1	Flat (recessed)	3/16	1
1/4x1	Flat (recessed)	1/4	1
1/4x1-1/2	Flat (recessed)	1/4	1-1/2
1/4x2	Flat (recessed)	1/4	2
C PLASTIC ANCHOR			
3/16x1-1/2	Round (flush)	3/16	1-1/2
1/4x1	Round (flush)	1/4	1
1/4x1-1/2	Round (flush)	1/4	1-1/2
1/4x2	Round (recessed)	1/4	2

5.11 ***D Plastic Anchors (Fig. 23):*** Used for interior or exterior walls where substantial holding power is required. When placed on exterior walls, use galvanized wood screws. Available sizes are shown in Fig. 23.



D PLASTIC ANCHORS				
ANCHOR SIZE NO.	WOOD SCREW SIZE NO.	FIG.	DIMENSION	
			DIA	LENGTH
			IN.	
10	8 OR 10	a,b,c	3/16	7/8
10	8 OR 10	d	3/16	1
12	10 OR 12	a,b,c,d	1/4	1
16	14 OR 16	a,b,c,d	5/16	1-1/2

Fig. 23—D Plastic Anchors

5.12 ***Machine Bolt Anchor (Fig. 24):*** Used where substantial holding power is required. Each anchor consists of an expansion shield and machine bolt. Diameter of hole required for installation and bolt size are usually indicated on the shield.

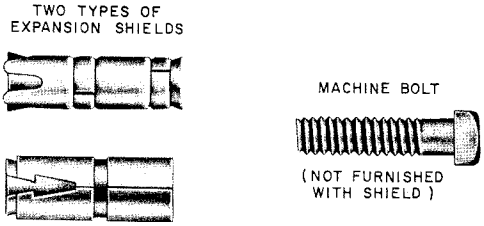


Fig. 24—Machine Bolt Anchor

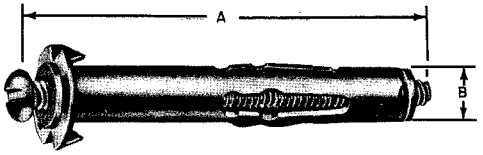
5.13 ***B Wall Screw Anchor (Fig. 25):*** Used for attachments to wall surfaces of hollow construction such as plywood, sheetrock, masonite, and lath-and-plaster wall. Each anchor consists of an expandable steel sleeve with an integral nut assembled with a steel pan head machine screw. To obtain maximum holding power, first determine the wall thickness, then select the proper anchor as shown on Fig. 25.

5.14 To install the B Wall Screw Anchor proceed as follows:

(1) Drill 1/4-inch hole then insert anchor and gently tap with hammer until prongs are firmly embedded in wall surface.

(2) Tighten screw until anchor is in fully expanded condition.

(3) After anchor is fully expanded, remove screw, attach hardware, then replace screw and tighten.



B WALL SCREW ANCHORS		
WALL THICKNESS RANGE (INCHES)	DIMENSIONS	
	SCREW LENGTH A (INCHES)	SLEEVE DIA. B (INCHES)
1/8 TO 5/8	1-1/2	1/4
5/8 TO 1-1/4	2	1/4
1-1/4 TO 1-3/4	2-1/2	1/4

Fig. 25—B Wall Screw Anchors

5.15 ***Toggle Bolts (Fig. 26):*** Toggle bolts are of two general types, flop-over and spring. They are intended for use in attaching fixtures to hollow wall type of construction. A secure toggle bolt installation depends on a satisfactory bearing area for the toggle. The hole should be restricted to a size that will just accommodate the toggle in the collapsed condition. Tables D and E list the various sizes of toggle bolts and the diameter to which the drilled hole should be restricted for best results.

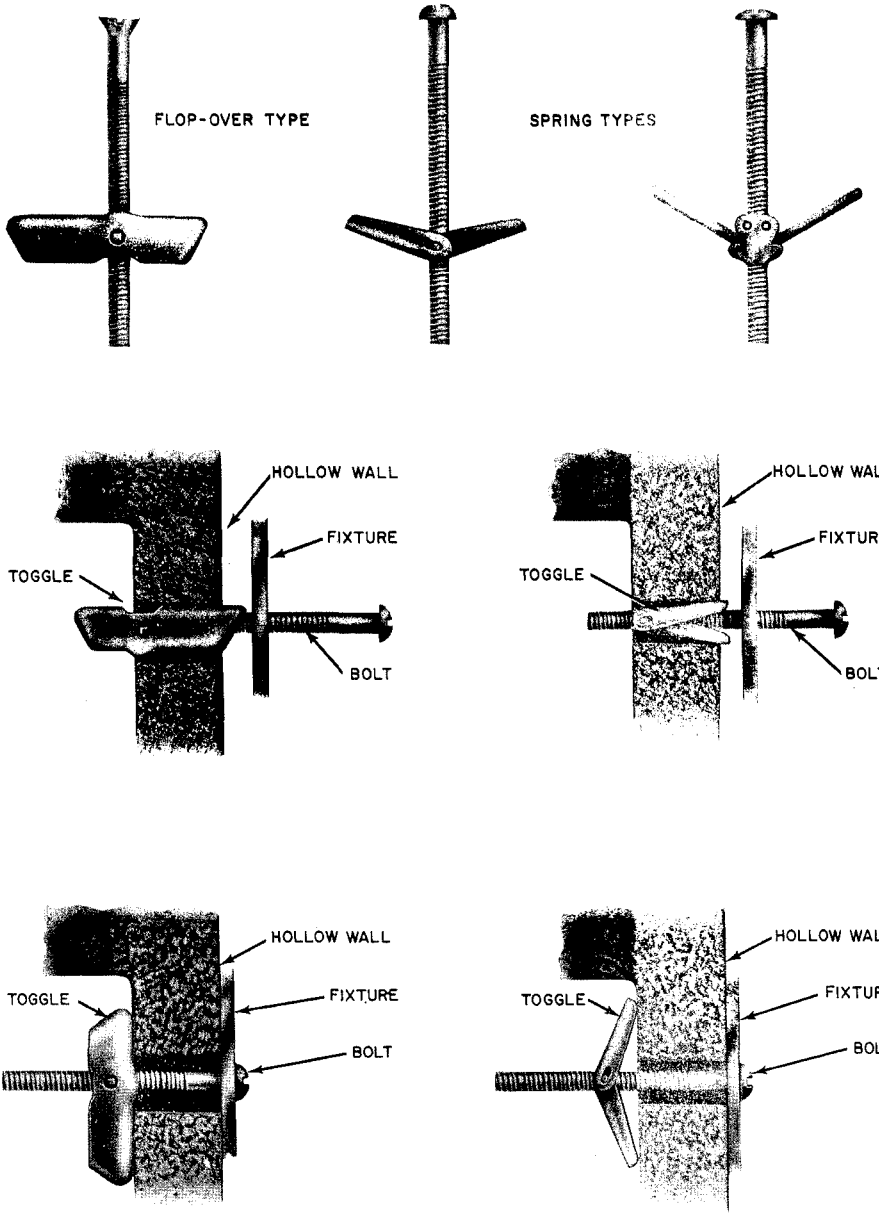


Fig. 26—Toggle Bolts

TABLE D

FLOP-OVER TYPE

SIZE DIAMETER LENGTH (IN.)	SPREAD OF TOGGLE (IN.)	TYPE OF HEAD	DIAMETER OF HEAD (IN.)	DIAMETER OF DRILLED HOLE (IN.)
1/4x3	2-1/2	Round	15/32	3/4
1/4x4	2-1/2	Round	15/32	3/4
5/16x5	2-3/4	Round	9/16	1
5/16x6	2-3/4	Flat	19/32	1

TABLE E

SPRING TYPE

SIZE DIAMETER LENGTH (IN.)	SPREAD OF WING (IN.)	TYPE OF HEAD	DIAMETER OF HEAD (IN.)	DIAMETER OF DRILLED HOLE (IN.)
1/8x3	2	Mushroom	5/16	1/2
1/8x4	2	Mushroom	5/16	1/2
3/16x3	2-1/4	Mushroom	7/16	5/8
3/16x4	2-1/4	Mushroom	7/16	5/8
1/4x3	2-1/2	Mushroom	15/32	3/4
1/4x4	2-1/2	Round	15/32	3/4
5/16x5	2-3/4	Round	9/16	1
5/16x6	2-3/4	Flat	19/32	1

TABLES FOR SELECTING ANCHORS

5.16 Tables F, G, and H provide a convenient method for determining the proper anchoring device to be used on various wall surfaces.

TABLE F

ANCHORING DEVICES FOR FASTENING WALL BRACKETS

TYPE OF WALL	B WALL BRACKET	C WALL BRACKET	D WALL BRACKET	E WALL BRACKET	S AND L WALL BRACKETS
Masonry and Substantial Brick Veneer	3/8-in. x 2-in. B Drive Anchors	1/2-in. x 3-1/2 in. B Drive Anchors	3/8-in. x 2-in. Hammer B Drive Anchors		
Thin Wall Veneer (Frame Construction)	3/8-in. x 6-in. Galv. Lag Screws[1]	1/2-in. x 6-1/2 in. Drive-screws	3/8-in. x 6-in. Galv. Lag Screws[1]		
Clapboards (Frame Construction)	3/8-in. x 4-in. Drive-screws	1/2-in. x 4-1/2 in. Drive-screws	3/8-in. x 4-in. Drivescrews		
Slab Veneer, Stucco, Rigid Composition Shingles[2] (Frame Construction)	3/8-in. x 4-in. Drive-screws	1/2-in. x 4-1/2 in. Drive-screws	3/8-in. x 4-in. Drivescrews		

Note 1: To be obtained locally.

Note 2: If the thickness of the slab veneer or stucco is such that the penetration of the drivescrews in a stud is less than 2-1/2 inches, use longer screws.

TABLE G

ANCHORING DEVICES FOR FASTENING WALL STRAPS

TYPE OF WALL	1/2-IN. WALL STRAP	5/8-IN. WALL STRAP	U WALL STRAP	PLATE WALL STRAP	CORNER WALL STRAP
Masonry and Substantial Brick Veneer	3/8-in. x 2-in. B Drive Anchors or 3/8-in. x 2-in. Galv. Mach. Bolts with Exp. Shield	1/2-in. x 3-1/2 in. B Drive Anchors or 1/2-in. x 2-1/2 in. Galv. Machine Bolts with Expansion Shields			3/8-in. x 2-in. B Drive Anchors
Thin Wall Veneer (Frame Construction)	3/8-in. x 6-in. Galv. Lag Screws[1]	1/2-in x 6-1/2 in. Drivescrews			3/8-in. x 6-in. Galv. Lag Screws[1]
Clapboards (Frame Construction)	3/8-in. x 4-in. Drivescrews	1/2-in. x 6-1/2 in. Drivescrews			3/8-in x 4-in. Drivescrews
Slab Veneer, Stucco, Rigid Composition Shingles[2] (Frame Construction)	3/8-in. x 4-in. Drivescrews	1/2-in. x 4-1/2 in. Drivescrews			3/8-in. x 4-in. Drivescrews

Note 1: To be obtained locally.

Note 2: If the thickness of the slab veneer or stucco is such that the penetration of the drivescrews in a stud is less than 2-1/2 inches, use longer screws.

TABLE H

ANCHORING DEVICES FOR FASTENING CABLE CLAMPS AND STRAPS

CABLE CLAMP NUMBER	CABLE STRAP NUMBER[3]	ANCHORING DEVICES			
		MASONRY	WOOD DRILL 1/16-IN. LEAD HOLE FOR NO. 8 SCREW. DRILL 1/8-IN. HOLE FOR NO. 14 SCREW AND STRAP NAIL TO AVOID SPLITTING.		PLASTER ON WOOD LATH OR PLASTER BOARD
		B DRIVE ANCHOR	R.H. WOOD SCREW[1] OR	STRAP NAIL[2]	R.H. WOOD SCREW
4		3/16 in. x 7/8 in.	1 in. No. 8	1-1/2 in.	1-1/2 in. No. 8
6		3/16 in. x 7/8 in.	1 in. No. 8	1-1/2 in.	1-1/2 in. No. 8
7		3/16 in. x 7/8 in.	1 in. No. 8	1-1/2 in.	1-1/2 in. No. 8
8		3/16 in. x 7/8 in.	1 in. No. 8	1-1/2 in.	1-1/2 in. No. 8
9	9	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
11	11	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
13	13	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
	16	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
17		1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
	20	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
21		1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
	24	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
25		1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
30	30	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
35		1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
	36	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
42	42	1/4 in. x 1 in.	1-1/2 in. No. 14	2. in	2 in. No. 14
	56	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14
	64	1/4 in. x 1 in.	1-1/2 in. No. 14	2 in.	2 in. No. 14

Note 1: Use Galv. Wood Screws on the outside of buildings.

Note 2: Galv. Plaster Board Nail may be used if a thinner nail is required.

Note 3: For selecting correct size of cable strap, refer to Table I.

◆ TABLE I ◆

CABLE STRAPS

CABLE DIAMETER (INCHES)		CABLE STRAP NUMBER
MINIMUM	MAXIMUM	
0.51	0.56	9
0.57	0.69	11
0.70	0.81	13
0.82	1.00	16
1.01	1.25	20
1.26	1.50	24
1.51	1.88	30
1.89	2.25	36
2.26	2.63	42
2.64	3.50	56
3.51	4.00	64