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U. S. NAVY STEEL ARCH RIB HUT

INSTRUCTIONS BOOKLET FOR ERECTING

THE 20'-0" x 56'-0" HUT

Manufactured for

NAVY DEPARTMENT, BUREAU OF YARDS AND DOCKS

by STRAN-STEEL DIVISION

GREAT LAKES STEEL CORPORATION

PENOBSCOT BUILDING, DETROIT 26, MICH.

UNIT OF NATIONAL STEEL CORPORATION

ERECTION SEQUENCE

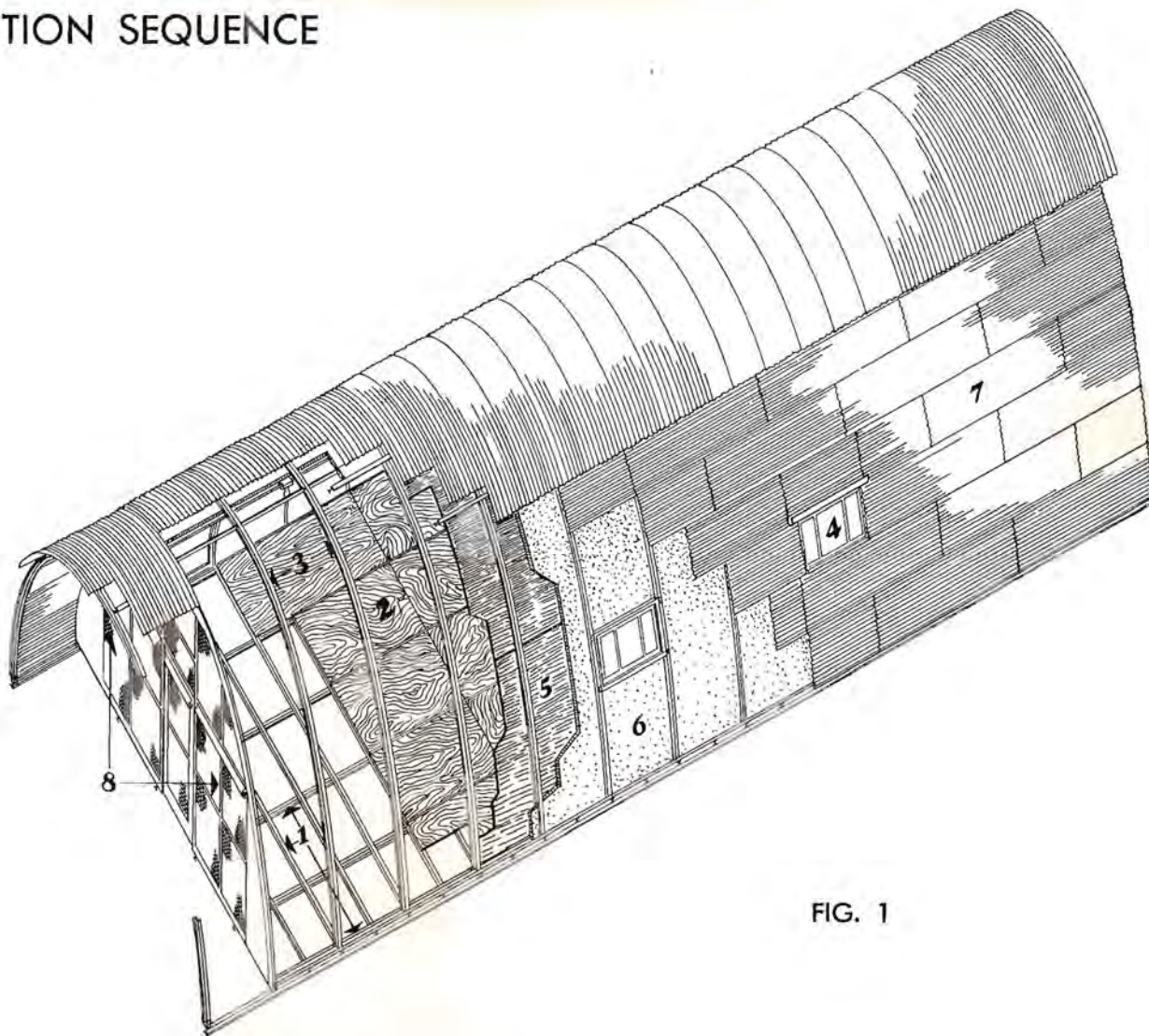


FIG. 1

1. **Floor joist assembly.** Lay the sills first, then the joists, then the channel plates. Level and square the whole assembly. (See pages 4 and 5.)
2. **Floor.** Lay out plywood floor panels on the joists. Install metal splines at lengthwise joints and nail the panels to the joists. (See pages 6 and 7.)
3. **Ribs.** Fasten the half-ribs together, locate, raise into position, fasten to the channel plate, attach the trimmers and purlins. Plumb the whole assembly. (See pages 8 and 9.)
4. **Flush type windows.** Assemble knock down windows. Attach clips and install between ribs. (See pages 10 and 11.)
5. **Inside covering.** Lay the Masonite sheets in place and nail them to the ribs. Place metal splines between the horizontal joints and nail Masonite battens over the rib joints. (See pages 12 and 13.)
6. **Insulation.** Stretch the insulation to the required length and lay the blanket over the inside covering between the ribs. (See pages 14 and 15.)
7. **Outside covering.** Nail corrugated sheets on the sides to the ribs and on the top to the purlins. (See pages 16 and 17.)
8. **Bulkheads.** Frame bulkheads in field from precut lumber. Install door, panels, molding, screen and canvas curtains. (See pages 20 and 21.)
9. **Electrical system.** Attach the cable to the inside covering with clips and attach the switch to position shown. (See pages 22 and 23.)
10. **Adaptations.** Plywood bulkhead, ventilators and smoke stack, continuous ventilator, bottom ventilators, wood foundations, end extension, side door. (See pages 24 to 35 inclusive.)
11. **Clean-up.** Save all scraps, bands, blocks, nails, screws, and crating material not used. Sort and store for future use.



Floor joist assembly



The floor complete



Ribs



Flush type window



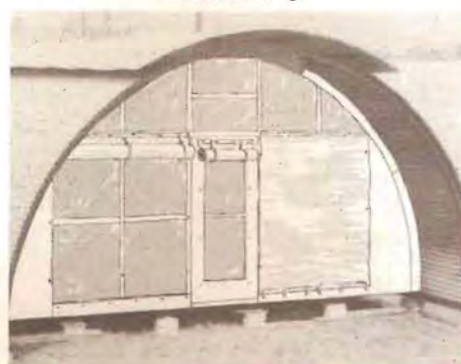
Inside covering



Insulation



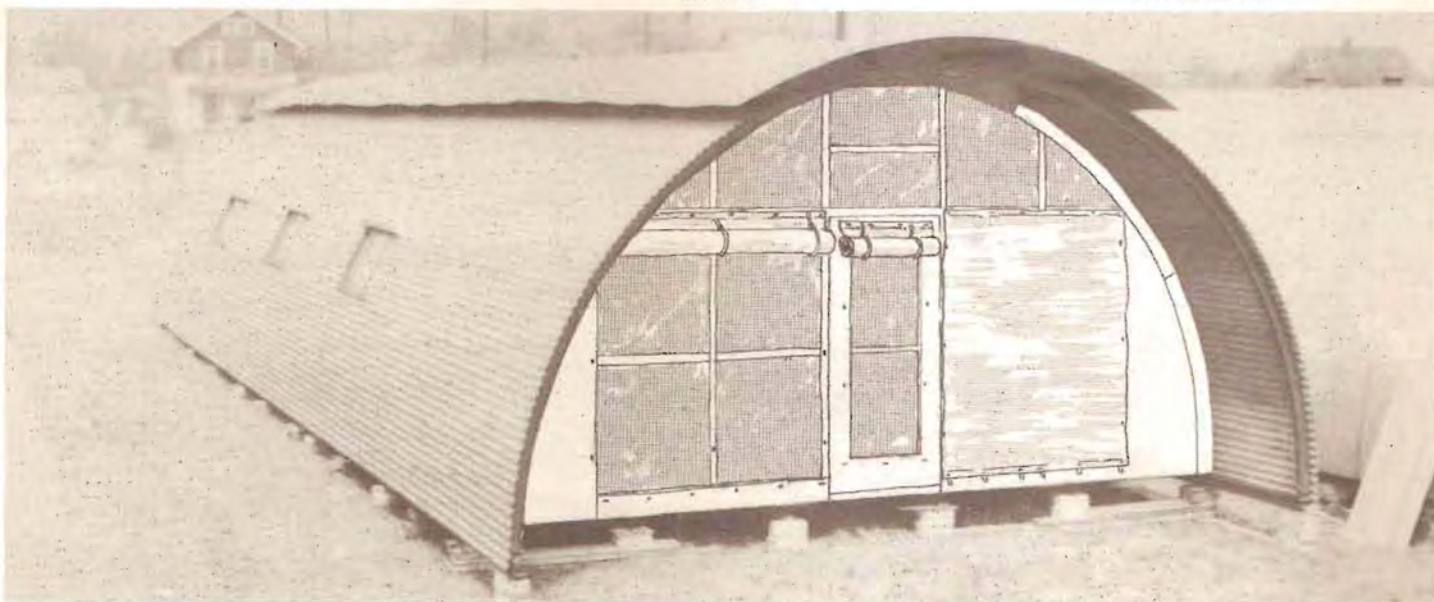
Outside covering



Bulkhead



Electrical system



Complete basic unit

THE FRAME (FLOOR JOIST ASSEMBLY)

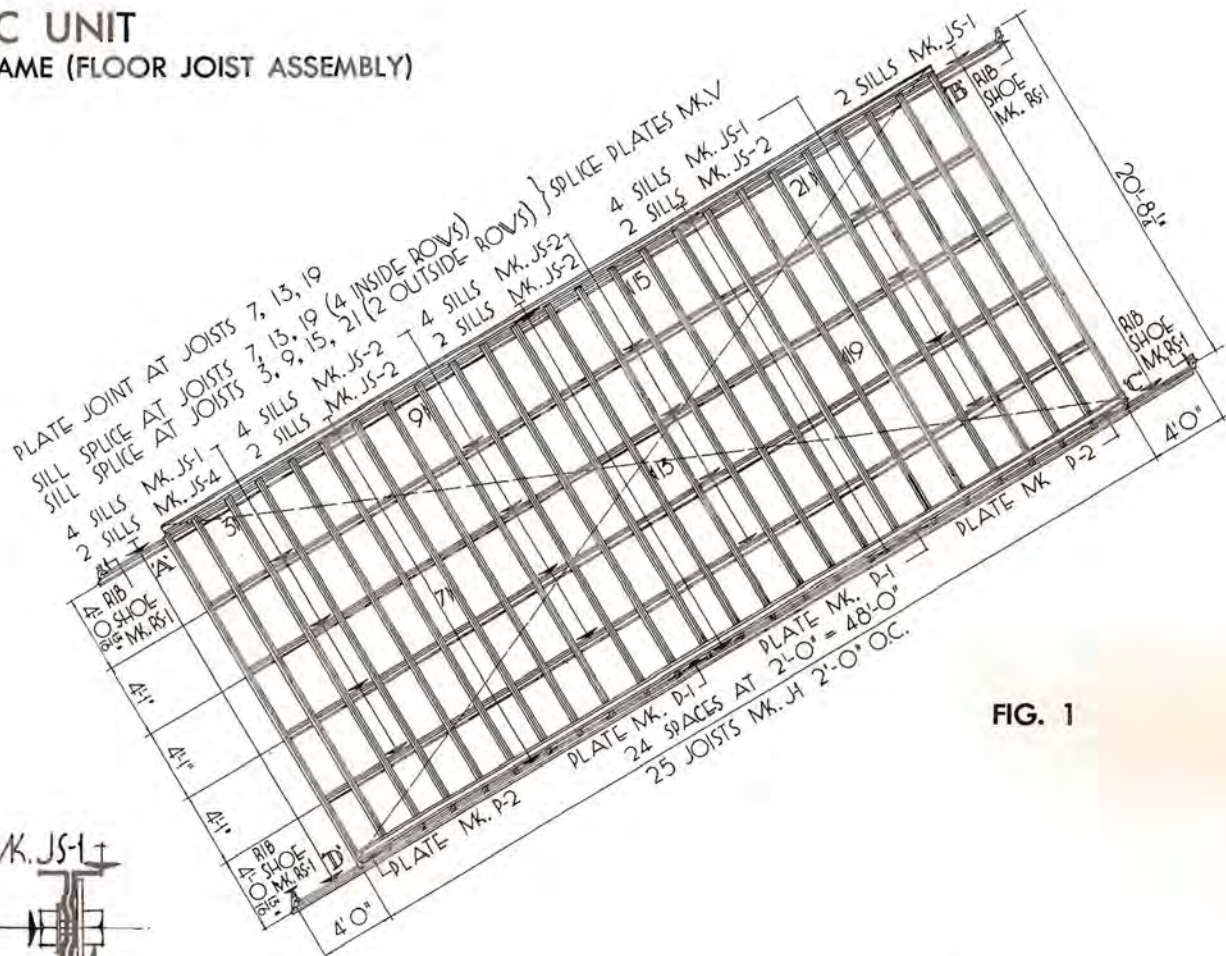


FIG. 1

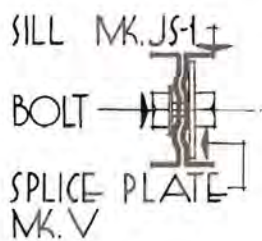


FIG. 2

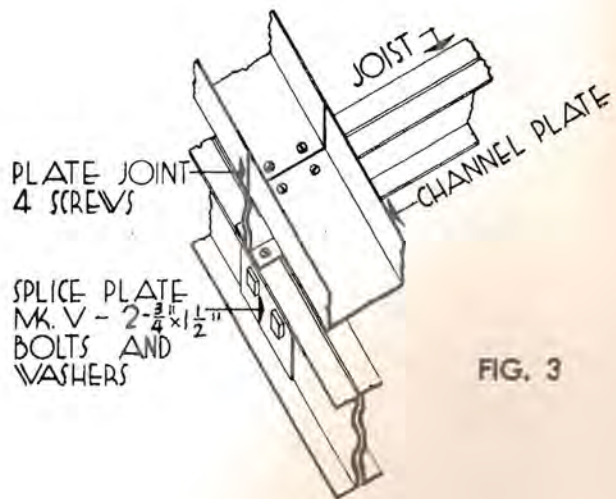
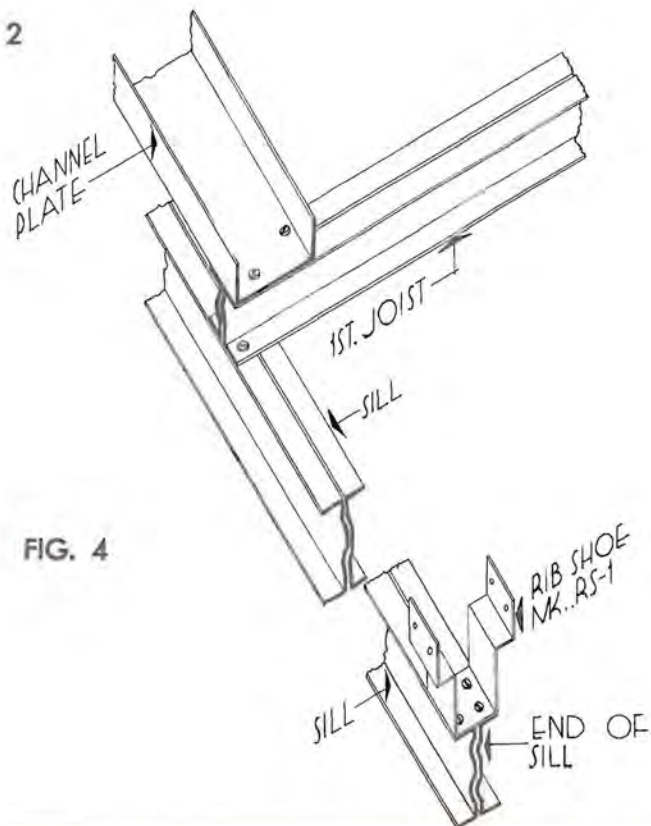


FIG. 3

BASIC UNIT THE FRAME (FLOOR JOIST ASSEMBLY)



Use blocks to level sills



Place channel plate



Screw rib shoe to sill

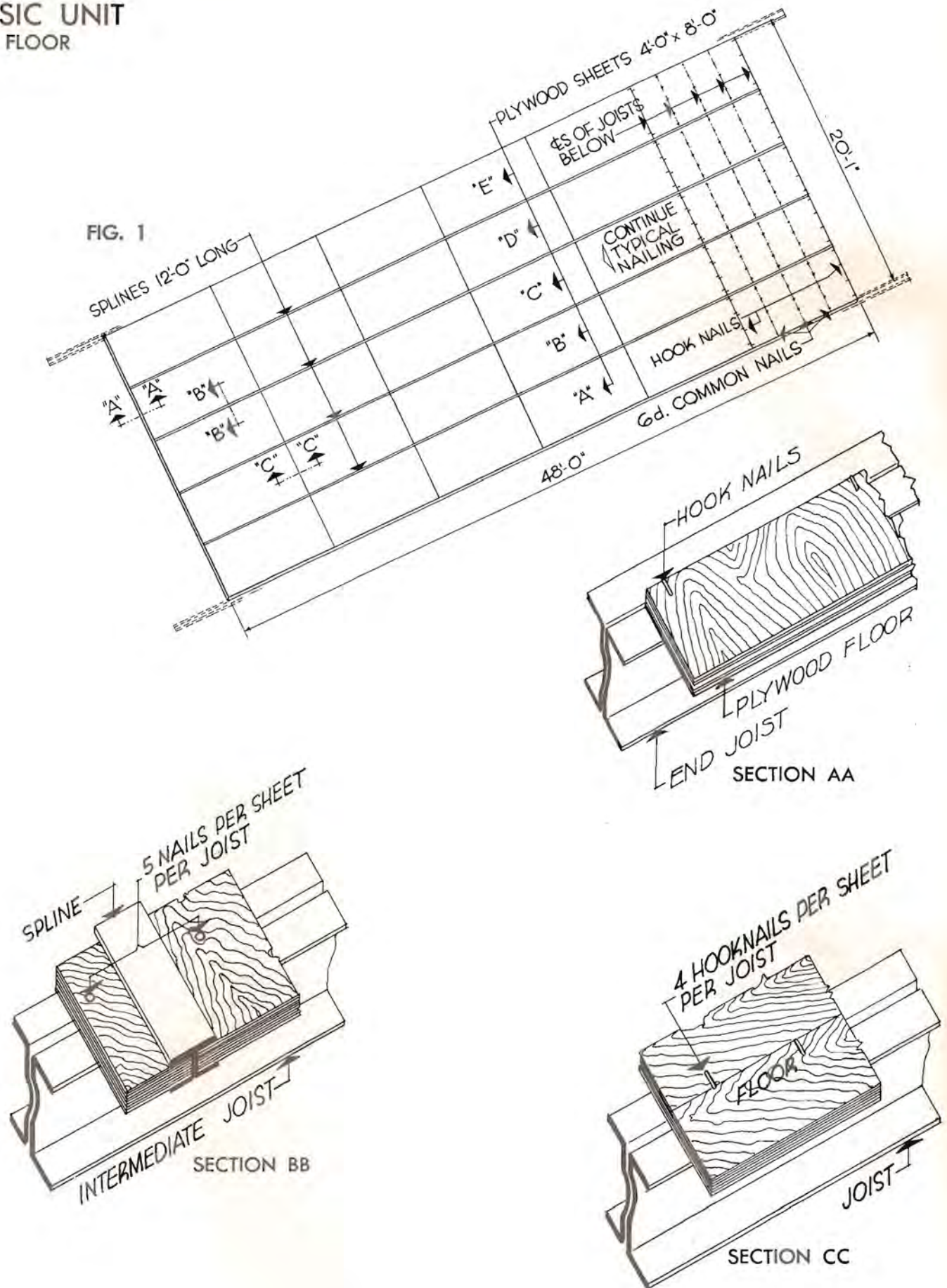


Complete joist assembly

The floor joist assembly consists of steel sills, joists, and channel plates. The sills run lengthwise of the hut on the ground and support the joists, which are fastened to the sills at right angles to them. At the extreme ends of the joists channel plates are fastened for receiving the ribs.

1. Level and tamp an area of ground approximately 30' x 60' for the hut site. If site is too uneven to level easily see wood foundation Adaptation page 33.
2. Lay the sills on the tamped ground in six parallel lines about 4' apart with the holes (for connecting the joists) facing upward. The end sills (Mk. JS-4 and JS-1) have 4 holes in one end. Place the 4-hole end to the outside of the hut. Line up the sills with the nailing groove curves matching (see figure 2). Otherwise, when the splice plate is tightened they will be forced out of line.
3. Lay the joists, connecting holes down, at right angles to the sills on 2' centers as shown. Use a drift pin to line up the holes and insert 2 screws diagonally opposite to each other at each connection. At each splice in the sills use 4 screws.
4. Place channel plates (Mk. P-1 and P-2) over ends of joists and parallel to outside sill joists. Screw these to the joists. Use 2 screws diagonally at each joist but use 4 screws where there is a joint in the channel plate. (See figure 3.) Finally screw the four rib shoes Mk. R S—1 to the extreme ends of the outside joist sills. (See photo above and figure 4.)
5. **Square up the above floor assembly.** Distance A-C should be the same as B-D. (See figure 1.) Use the roll of wire from the tool box for measuring these distances. Hold one end of the wire on the inside lip of the channel plate "A". Stretch to the same point at "C". Do the same from B to D. Shift the corners until distances A-C and B-D are equal. Check the ends and sides for straightness, using a line or wire and recheck for square. Then check the assembly for level starting at joist B-C. With this joist level, proceed to level the channel plate, working from C to D. Level the channel plate by placing the level on the lip of the plate in about four locations. When the channel plate is levelled, level the other end joist, working from D to A. Then proceed with levelling the channel plate from A to B. Bring the other joists to level, using level at four points as for opposite side. Use small wedges or blocking made from crating lumber to raise the sills, and scoop dirt from under the sills to lower. Be sure the floor assembly is level before proceeding.

BASIC UNIT THE FLOOR





Lay-out plywood panels



Panels butt over joist



Nail panels in place



The complete floor

The floor is covered with 4' 0" x 8' 0" plywood panels nailed to the floor joists. Metal splines fit between the lengthwise joints.

1. Lay out all the plywood panels (clear side up) starting with row "A" and proceeding to rows "B", "C", "D" and "E" fitting the metal splines between the rows as each is laid. (See Fig. 1 and Sect. B-B.) The ends of the panels should butt over the center of joists Nos. 5, 9, 13, 17, 21 and 25.
2. Nail the panels in place. Use 6d common nails at intermediate joists (see Sect. B-B), and hook nails at the ends of the panels (see Sect. C-C and A-A). To establish a nailing line for the intermediate rows of nails, take a chalk line, hold each end over the center of the joist, pull the line taut and snap. This will leave a guide line on the panel. Do not use more nails than the sketches call for. (See Sect. B-B and C-C.)

BASIC UNIT

THE FRAME (RIB ASSEMBLY)

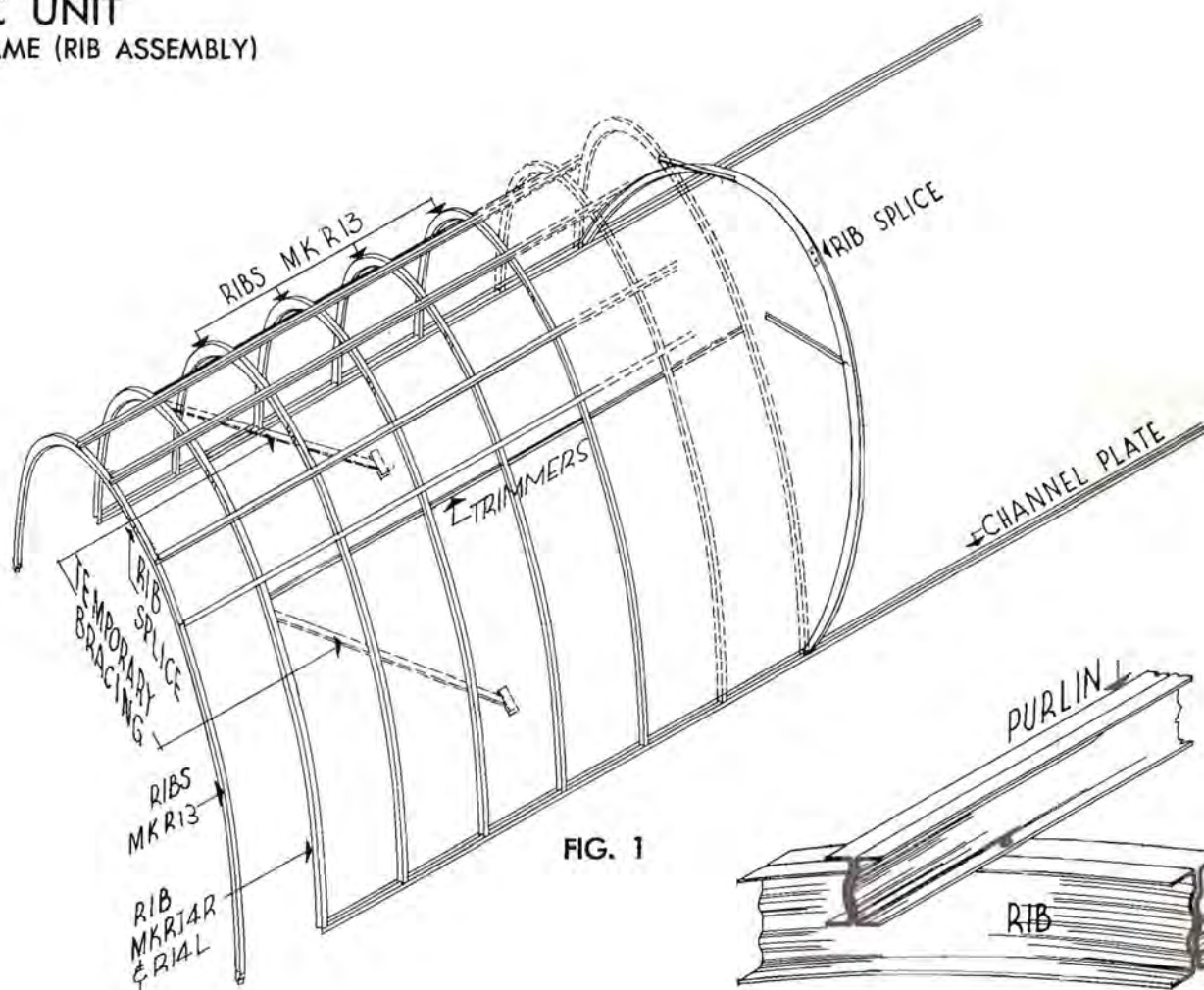


FIG. 1

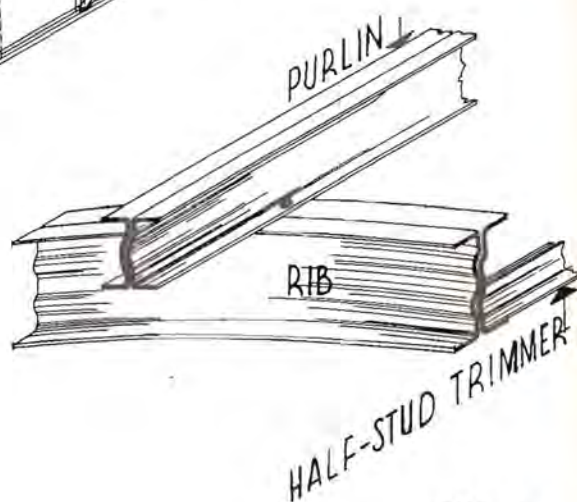


FIG. 4

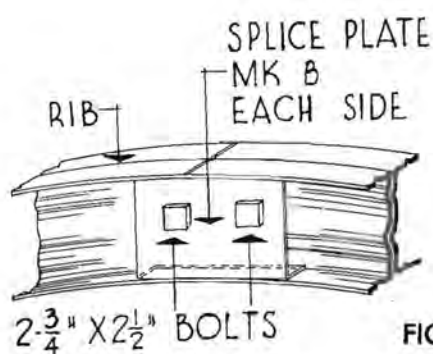


FIG. 2

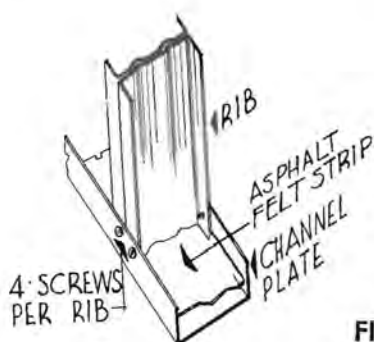


FIG. 3

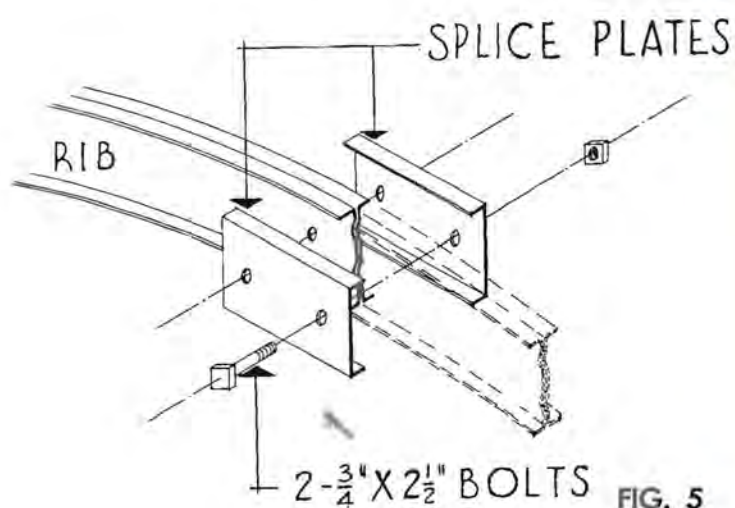


FIG. 5



The half ribs are joined with the splice plate



Assemble all the ribs on the floor



Raise the ribs



The ribs in place

The rib assembly consists of two steel sections, or "half-ribs", which are joined together at the top and whose ends fasten to the channel plate above every other joist beginning with the end joist. On top of the ribs are four rows of purlins for receiving the roofing and there are two rows of trimmers for receiving the ends of the inside covering sheets. Construct a scaffold out of crate lumber to use for making purlin and trimmer connections at top of rib.

1. Before ribs are raised, lay 3" wide continuous asphalt strips in channel plate. (See Fig. 3.)
2. Assemble all ribs on the floor (See Photograph) before raising any. The ribs are joined at the top with two channel splice plates $3\frac{7}{16}" \times 5"$ x No. 12 gauge Mk. B and $2\frac{3}{4}" \times 2\frac{1}{2}"$ bolts. (See Fig. 5.) In assembling the ribs with the wood blocking take care to have the bolt head on the block side of the rib so that later work will clear. The ribs with the wood blocking will be the second ribs from each end and the blocking side should face outward. Raise one of these ribs first and secure it into the channel plate using 4 screws. (See figure 3.) Plumb and brace this rib.
3. Fasten the trimmers to the next rib while it is on the floor. Raise this rib, fasten the trimmers to the rib already raised (see figure 1), and secure the rib to the channel plate. Repeat this operation for each successive rib. Since end ribs have no trimmers do not raise them until purlins are in place (see item 4 below).
4. Fasten the purlins in place (see figure 4) after the ribs are raised, using two (2) screws diagonally at each rib.
5. Recheck the entire structure to make certain it is plumb.

BASIC UNIT FLUSH TYPE WINDOWS

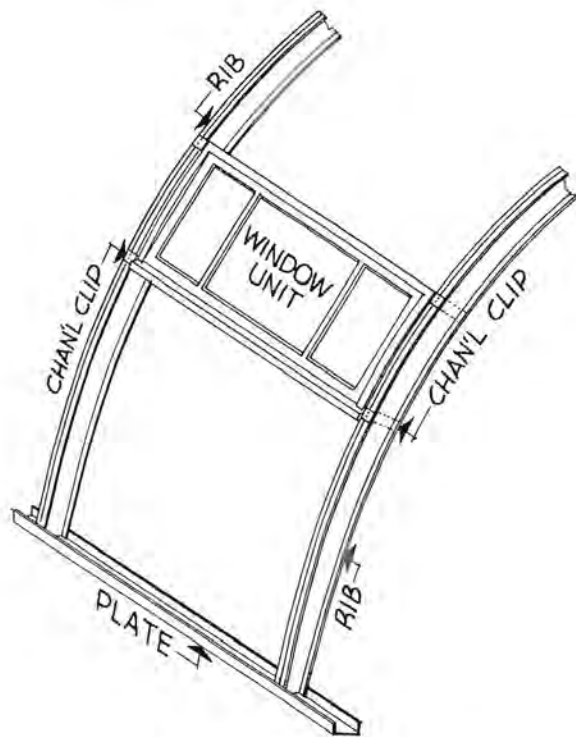


FIG. 1

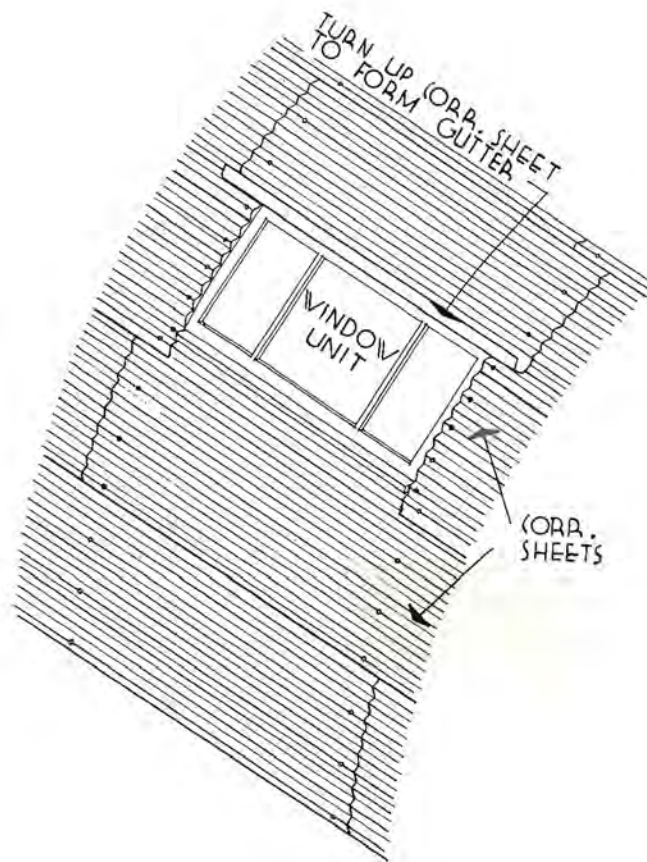


FIG. 2

There are six windows to a hut, three on each side. On one side of the hut they are installed between the fourth and fifth ribs, the seventh and eighth ribs, and the tenth and eleventh ribs. On the other side of the hut they are installed between the fifth and sixth ribs, the eighth and ninth ribs, and the eleventh and twelfth ribs. The window frames are furnished knocked down and the hardware is shipped loose.

1. Assemble the window frames (note that the jambs are each of opposite hand) using 8d nails.
2. Place sash and screens in position in assembled frame and attach the hinges to them with flat head wood screws.
3. Attach butterfly catches for holding the screens. Attach hooks and eyes for holding the windows.
4. Nail the channel clips to the jambs of the windows (see Figure 5) with 4d nails.
5. Set the windows in place between the ribs. To do this, spring the ribs enough to allow the flanges of the clips to pass the flanges of the ribs.
6. Determine the proper height of the window by placing a 3' 11 $\frac{7}{8}$ " x 4' 0" sheet of Masonite on the inside wall against the ribs. One 3' 11 $\frac{7}{8}$ " long edge will rest on the floor and the bottom of the window sill will rest on the top of the Masonite sheet. (see Figure 4). With the window thus located, nail the side jamb clips into the ribs, using 8d nails. If desired, window may be raised or lowered the width of one corrugated sheet. If this is done, use corrugated sheets to determine the proper height of window, then cut inside covering to fit. If bottom ventilators are used (see adaptation page 30) do not lower window.
7. Nail the 3" x 4' 0" asphalt impregnated felt strip to the window head (see Figure 3), using $\frac{7}{8}$ " roofing nails. Seal open joints with sash sealing compound.

BASIC UNIT FLUSH TYPE WINDOWS



Assemble the knock down window frames



Place sash and attach hinges



Place the windows between the ribs

Photograph 34



Nail the jamb clips into the ribs



Completed window

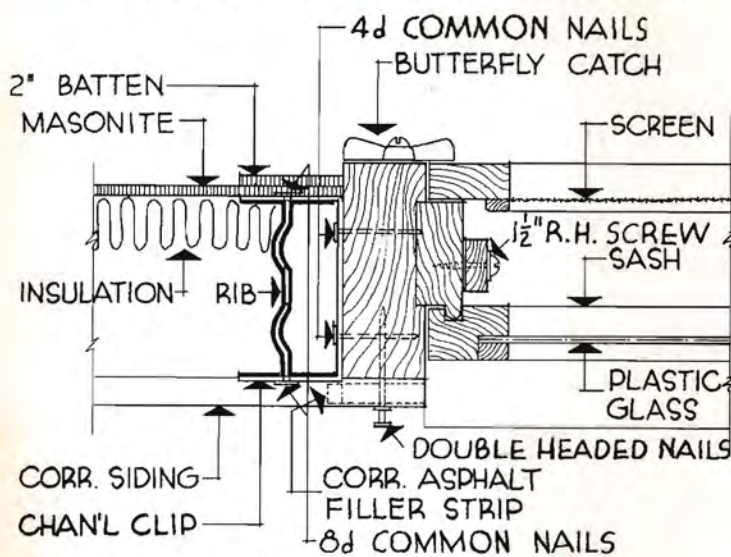


FIG. 5

JAMB

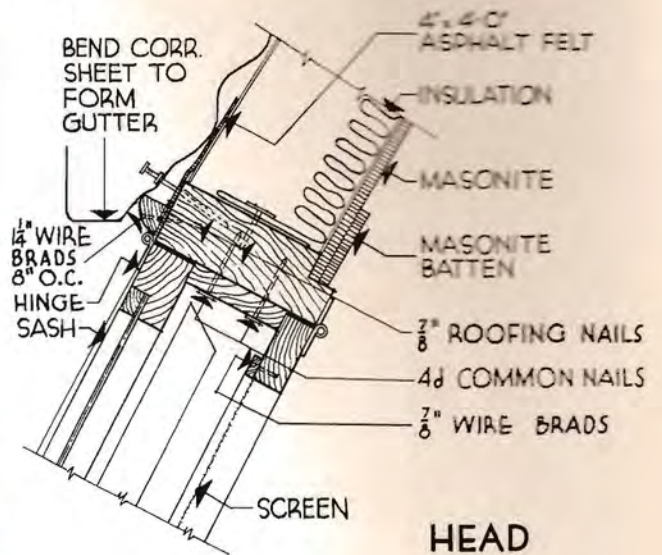


FIG. 3

HEAD

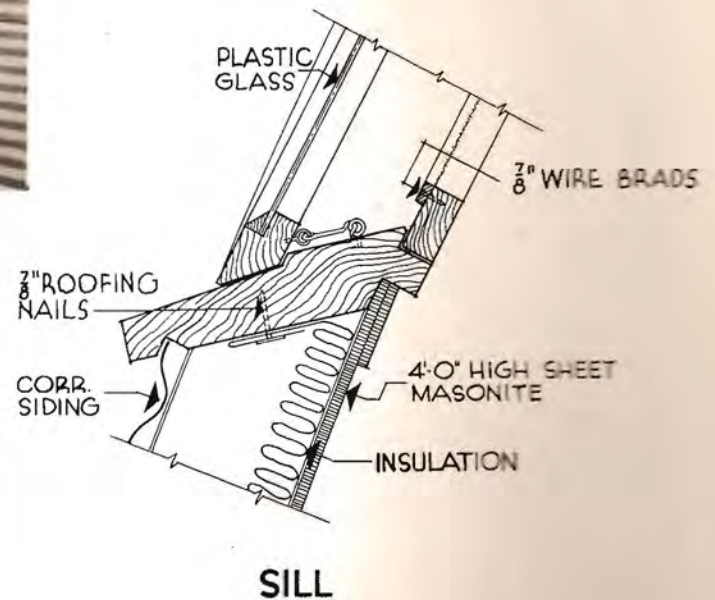


FIG. 4

SILL

BASIC UNIT INSIDE COVERING

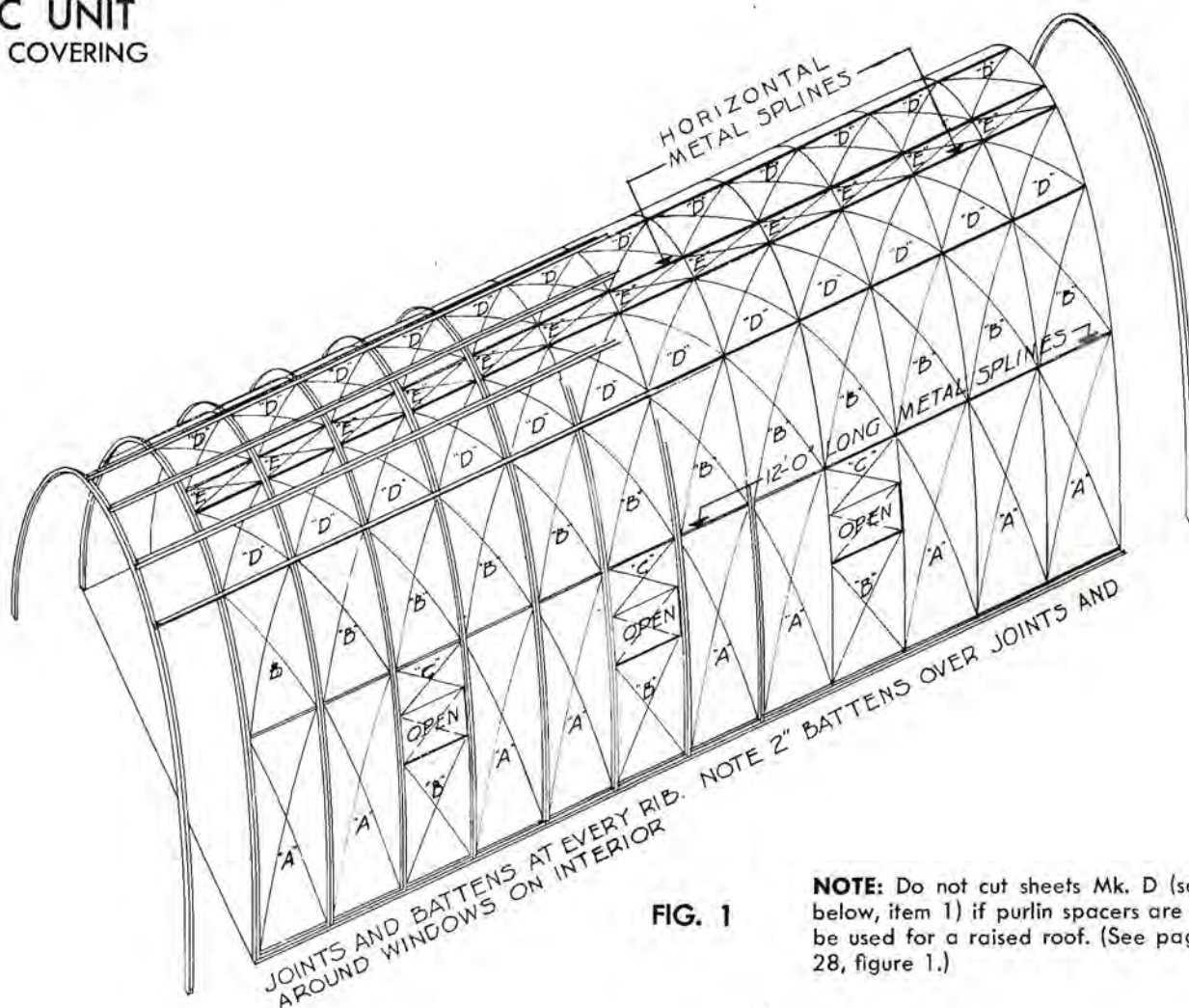


FIG. 1

NOTE: Do not cut sheets Mk. D (see below, item 1) if purlin spacers are to be used for a raised roof. (See page 28, figure 1.)

The inside of the hut is covered with sheets of painted Masonite $\frac{1}{8}$ " thick, nailed to the ribs, painted side facing inside. Metal splines fit between the horizontal joints. 2" wide Masonite batten strips are nailed over the rib joints and around the windows.

1. Take 12 Masonite sheets Mk. D ($2' 11" \times 3' 11\frac{3}{8}"$) and cut to $1' 6" \times 3' 11\frac{3}{8}"$, mark these sheets "E" and apply later. See Item 6 below.
2. Before laying the inside covering check ribs to see that they are plumb and true and measure $4' 0"$ center to center. Lay the sheets Mk. A ($3' 11\frac{3}{8}" \times 8' 0"$) in pairs in the bottom row starting with a pair between two windows. Lay the sheets with the $3' 11\frac{3}{8}"$ side on the floor and with the edges of the $8' 0"$ side butting over the center of the ribs. At this point drive a $1\frac{1}{2}"$ Simplex nail. (See Fig. 2.) This will hold the sheet on either side of the rib. On the end rib, of course, these nails will hold only one sheet. Space these nails as required to hold the sheet snug against the rib. At the windows install the sheets Mk. B ($3' 11\frac{3}{8}" \times 4' 0"$) to cover the space between window sill and floor. These sheets were previously used to determine the height of the window sills. Above window head install sheets Mk. C ($3' 11\frac{3}{8}" \times 2' 2"$) so that the tops of these sheets line with the tops of the previously installed A sheets. If window has been raised or lowered (see item 6 page 10) these sheets above and below the windows must be cut in the field to fit. Repeat the above procedure on the other side of the hut.
3. Install the metal splines at the top of the sheets covered in item 1. (See Fig. 4.)
4. Lay the sheets Mk. B ($3' 11\frac{3}{8}" \times 4' 0"$) in the next row in same manner as covered in item 2. Start with two sheets at the center of the hut and work out sheet by sheet to the ends of the hut. After these sheets are installed on both sides of the hut fit the splines in place at the top of these rows.
5. Lay the sheets Mk. D ($3' 11\frac{3}{8}" \times 2' 11"$) in the next rows just as the B sheets were laid and install the splines at the top of the row. Do this for both sides of hut.
6. This leaves only the closing row of sheets Mk. E in the top of the hut. Spring these sheets slightly to fit them into the splines on the adjacent rows, then nail them to the ribs with Simplex nails.
7. Nail the quarter round wood mold in place at the floor using $1\frac{1}{4}"$ wire brads, 18" O.C. (See Fig. 3.)
8. Nail the 2" wide batten strips over the rib joints and around the windows using 6d nails 8" O.C. (See Fig. 2.)

BASIC UNIT INSIDE COVERING

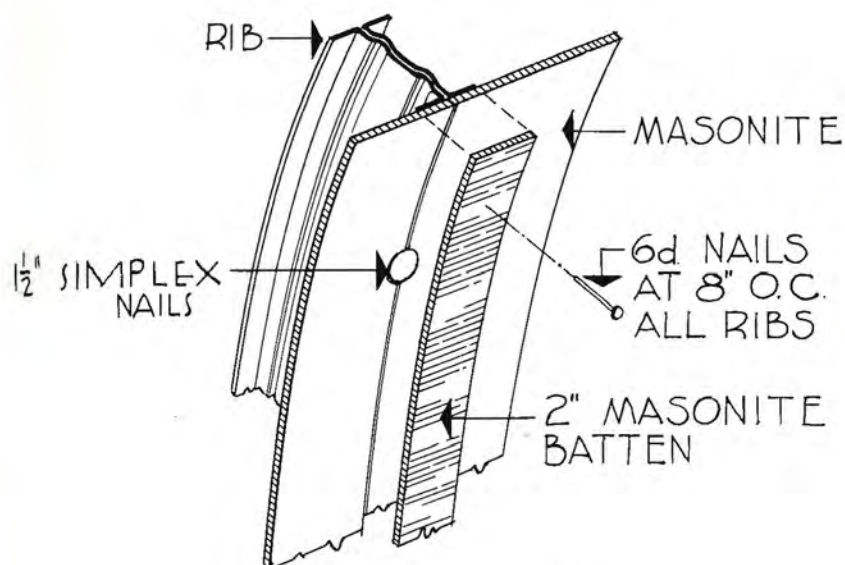


FIG. 2



Start with a pair between two windows

Photograph 35



Metal splines between horizontal joints

Photograph 39

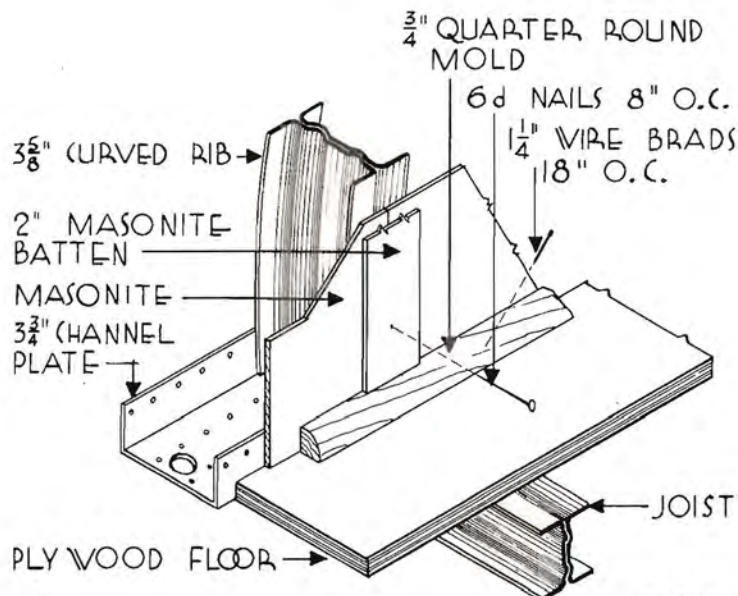


FIG. 3



2" wide battens around windows



FIG. 4



Inside covering installed

BASIC UNIT INSULATION

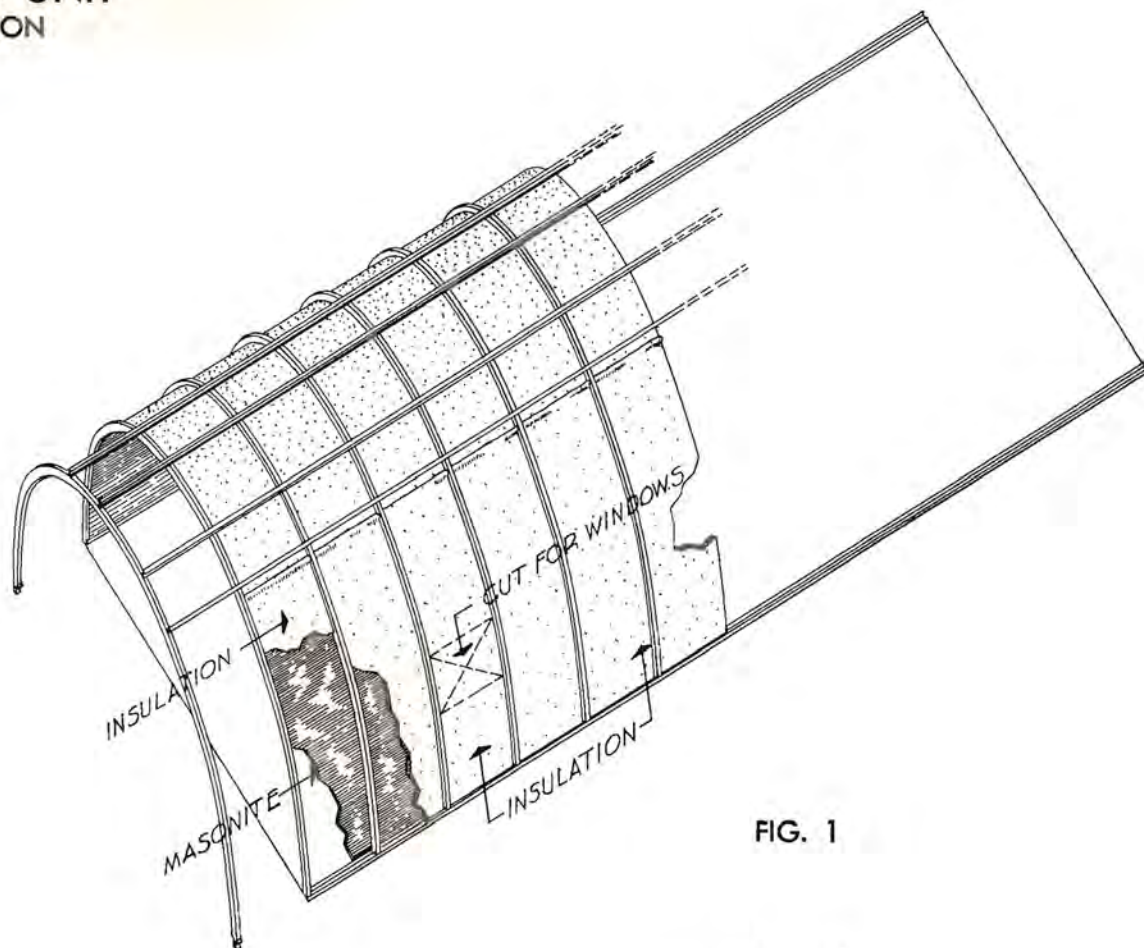


FIG. 1

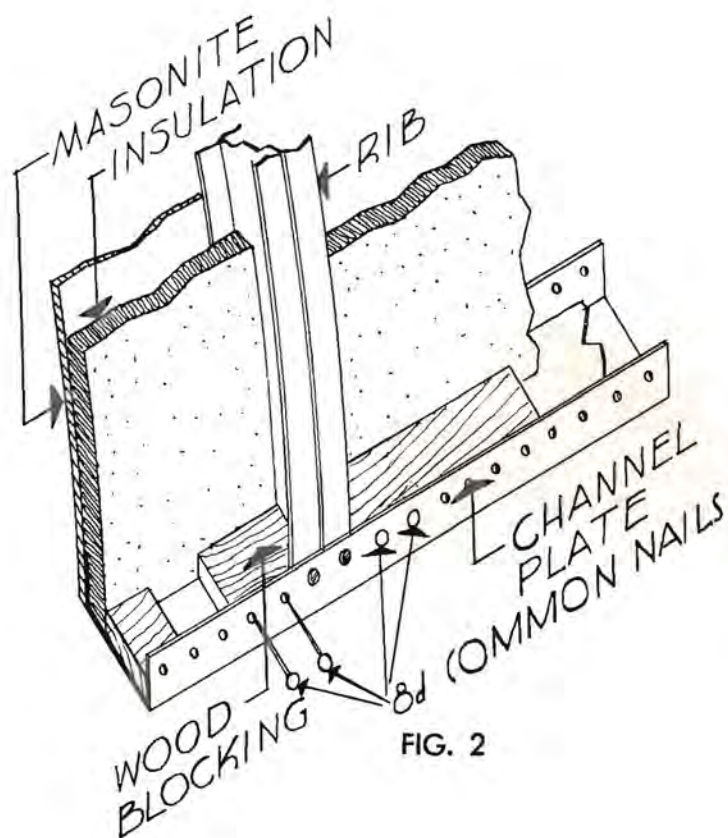


FIG. 2



Unroll and stretch



Unroll between ribs

Photograph 40



Fit insulation around windows



Insulation installed

Over the Masonite inside covering and between the ribs of the hut is a layer of flexible-type insulation. The insulation is furnished in short lengths which will stretch to cover the entire area between a pair of ribs.

1. Stretch each piece of insulation to the required length of 31' 6".
2. Roll up the insulation just stretched. Start at each end of the piece and roll toward the middle.
3. Unroll it between the ribs over the inside covering of the hut starting at the center top and unrolling down each side.
4. Wedge blocks of wood between the channel plate and the insulation to hold each end of the insulation (see figure 2) and nail to channel with 8d nails.
5. Cut the insulation around the windows.
6. With 1½" Simplex or 7/8" roofing nails, nail the cut ends of the insulation to the head and sill of the window. (See Figs. 3 and 4, Page 11.)

BASIC UNIT OUTSIDE COVERING

NOTE: At ends of curved sheets fasten sheets together, using holtite screws, 1" from edge of sheet.

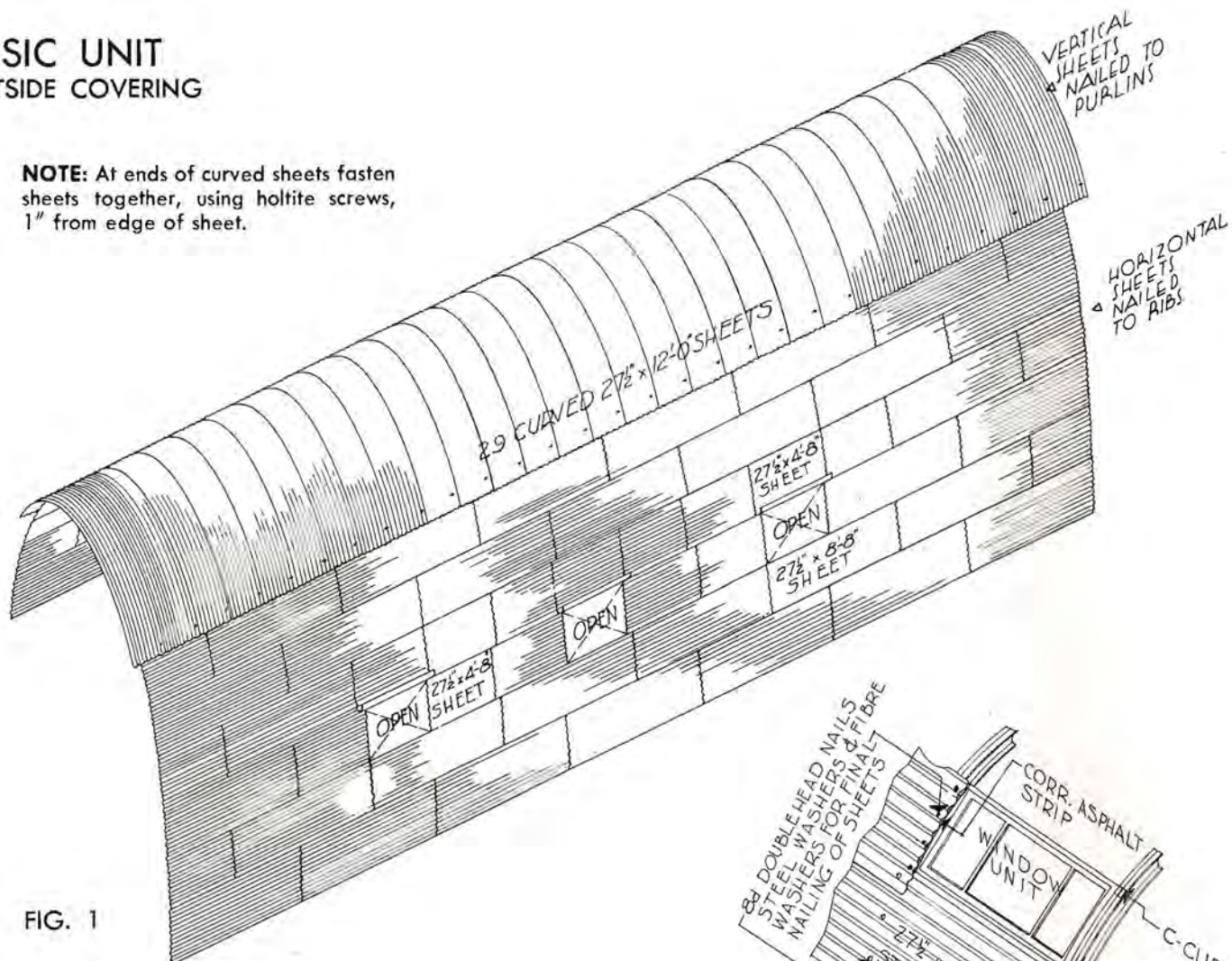


FIG. 1

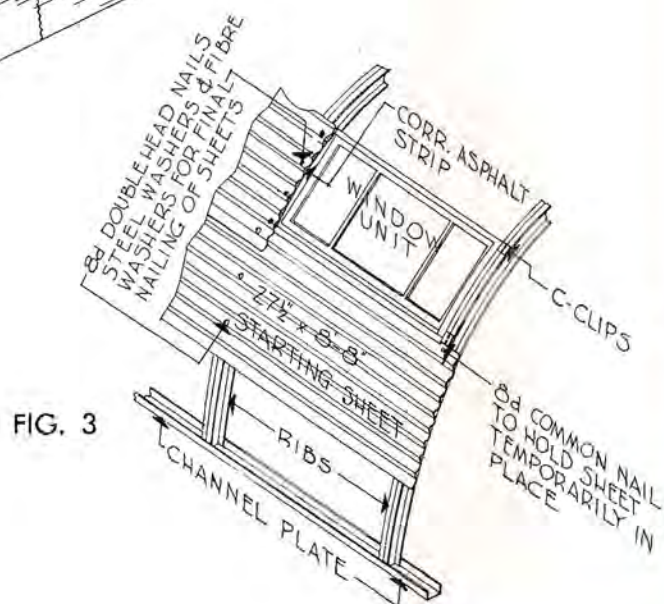


FIG. 3

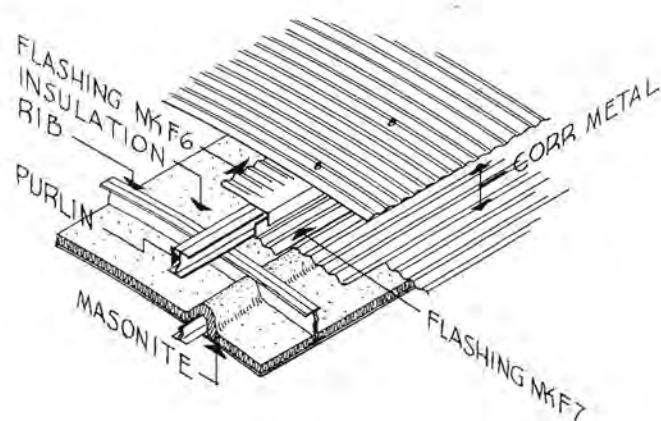


FIG. 2

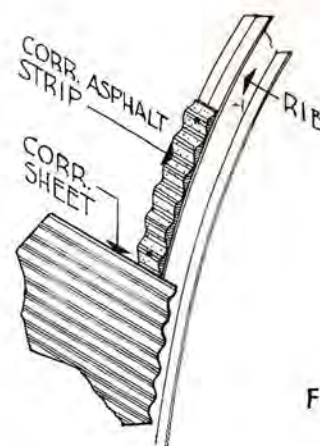


FIG. 4

BASIC UNIT OUTSIDE COVERING



Start with row under window sill



Drive one nail in valley of first corrugation



"Butter" laps



Between sheet and window place corrugated asphalt



Outside covering

The hut is covered with corrugated galvanized sheets. Up to a point $4' 1\frac{1}{2}"$ (see Fig. 1) from the top center of the hut the sheets are nailed to the ribs using double-headed nails with steel and fibre washers. From there up and over the top they are nailed to the purlins. The sheets nailed to the ribs are flat and have the corrugations running lengthwise of the hut. Those nailed to the purlins are curved and have the corrugations running at right angles to the purlins.

1. Start the sheets with the row running under the window sill (see figure 3). At one of the windows take an $8' 8"$ sheet, fit it snugly into the groove under the window sill turning the top edge of sheet out (see figure 4, page 11). One end of the sheet should project $4"$ beyond the center line of the rib adjoining the window. (See figure 3.) Drive one 8d nail at each rib in the valley of the first corrugation at the top of the sheet. (This is to hold the sheet temporarily.)
2. Place the adjoining sheets in the same row. Each sheet should extend $4"$ past the center line of the rib, which produces an $8"$ lap. Lap all sheets the same direction. Each end lap should be "buttered" with mastic for a width of $2"$ between the sheets to provide a seal. When each sheet is in place and lined with the starting sheet nail it temporarily as described in item 1 above. At each bulkhead rib (the ones with the wood blocks) insert strips of corrugated asphalt between the rib and the horizontal corrugated iron covering. Take care that the asphalt strip and corrugated iron corrugations match, then nail corrugated strip to rib with common nails before nailing corrugated iron. (See figure 4.)
3. Place the sheets below the starting row next, lapping them under the starting row $1\frac{1}{2}$ corrugation ($3\frac{1}{2}"$). "Butter" and nail these sheets using double-headed nails with steel and fibre washers, placing the fibre against the corrugated iron. Each sheet shall be nailed at each rib placing one nail at the laps and two nails evenly spaced between laps ($8"$ on center). Proceed with the row of sheets above the starting row lapping these sheets over the row below $1\frac{1}{2}$ corrugation ($3\frac{1}{2}"$). Nail this row as described above. Do not drive top nails in rows until row above has been put into position. Proceed this way, row by row, until the first purlin is reached, completing each row before the next row is started.
- 3a. Window sheets. The sheets at the sides of the windows extend only to the edge of the jamb. Otherwise, the window will not open. Between the sheet and the window jamb place a strip of corrugated asphalt. Cut these pieces to fit and insert them after the sheet has been placed. Then nail through the sheet and strip to the window jamb. Nail at every other corrugation with double-headed nails and steel and fibre washers.
4. Gutters. Form the gutter from a $4' 8"$ sheet by bending the lower edge over a plank. Set this in place with the corrugations matching the adjacent sheets and nail up as previously outlined. Nail the quarter-round in place (see figure 3, page 11). This will seal the space between the gutter and the window head.
5. Flashing. Between the bulkhead ribs nail the lower flashing piece Mk. F-7 to the ribs with common nails to bring the vertical part of the flashing as near the purlin as possible (see figure 2). After this is done nail the top piece of flashing Mk. F-6 to the purlin with only enough common nails to hold the flashing while the curved roof sheets are placed. Note—Flashing is continuous between bulkheads only and does not occur between bulkhead and end ribs.
6. Curved sheets. Start with a sheet at one end of the hut, project it $1' 1"$ past the center line of the end rib and turn it so the outside edge of this sheet (corrugation) is turned down. Center the sheet on the purlins so that the overhangs are equal and nail sheet to purlins at $8"$ on centers using double head nails and steel and fibre washers. Proceed sheet by sheet lapping each sheet over the previous one $1\frac{1}{2}$ corrugations ($3\frac{1}{2}"$) until the top of the hut is covered. Always nail through the high point of a corrugation.
7. Touch up scratches, abrasions etc. with paint supply.

ISOMETRIC

FIG. 1

BASIC UNIT

1. $3\frac{5}{8}$ " SILL JOISTS
2. $2\frac{5}{16}$ " FLOOR JOISTS
3. $3\frac{3}{4}$ " CHANNEL PLATE
4. $3\frac{5}{8}$ " CURVED BULKHEAD RIB
5. $3\frac{5}{8}$ " CURVED RIBS
6. $2\frac{5}{16}$ " PURLINS
7. HALF STUD TRIMMERS
8. SILL SPLICE PLATES
9. RIB SPLICE PLATES
10. RIB SHOE
11. $\frac{3}{4}$ " BOLT AND NUT
12. $\frac{3}{4}$ " WASHERS
13. HOLTITE SCREWS
14. 6D COMMON NAILS
15. 8D DOUBLE HEAD NAILS
16. FIBRE AND STEEL WASHERS
17. MASONITE SHEETS
18. 2" WIDE MASONITE BATTENS
19. 24 GA. WALL SPLINES
20. 1" THICK INSULATION.
21. 24 GA. CURVED CORR. GALV. SHEETS
22. 24 GA. FLAT CORR. GALV. SHEETS
23. CORR. GALV. FLASHING
24. 6D HOOK NAILS
25. $1\frac{1}{4}$ " WIRE BRADS.
26. 14 GA. METAL DOOR SILL.
27. $\frac{3}{4}$ " QUARTER ROUND SHOE MOULD.
28. WOOD WINDOW, COMPLETE WITH SCREEN.
29. 30# FELT FLASHING STRIP 3" WIDE.
30. $\frac{1}{2}$ " PLYWOOD FLOOR
31. 20 GA. METAL FLOOR SPLINES
32. 6 LIGHT ROMEX CORD
33. LAMP HOLDER.
34. SCREEN DOOR
35. CANVAS DOOR PANEL
36. CANVAS
37. CORRUGATED ASPHALT STRIP.
38. CORRUGATED SHEET BENT UP TO FORM GUTTER.
39. 2" x 4" WOOD PIECES.
40. WIRE SCREEN.

FIG. 2

ADAPTATIONS (Pages 24 to 35 inclusive)

1. 8" KD. VENTILATOR, 6" KD. SMOKE-STACK
2. PLYWOOD BULKHEAD PANELS
3. ADJUSTABLE METAL LOUVERS
4. WOOD PANEL DOOR
- (37. CORRUGATED ASPHALT STRIP.)

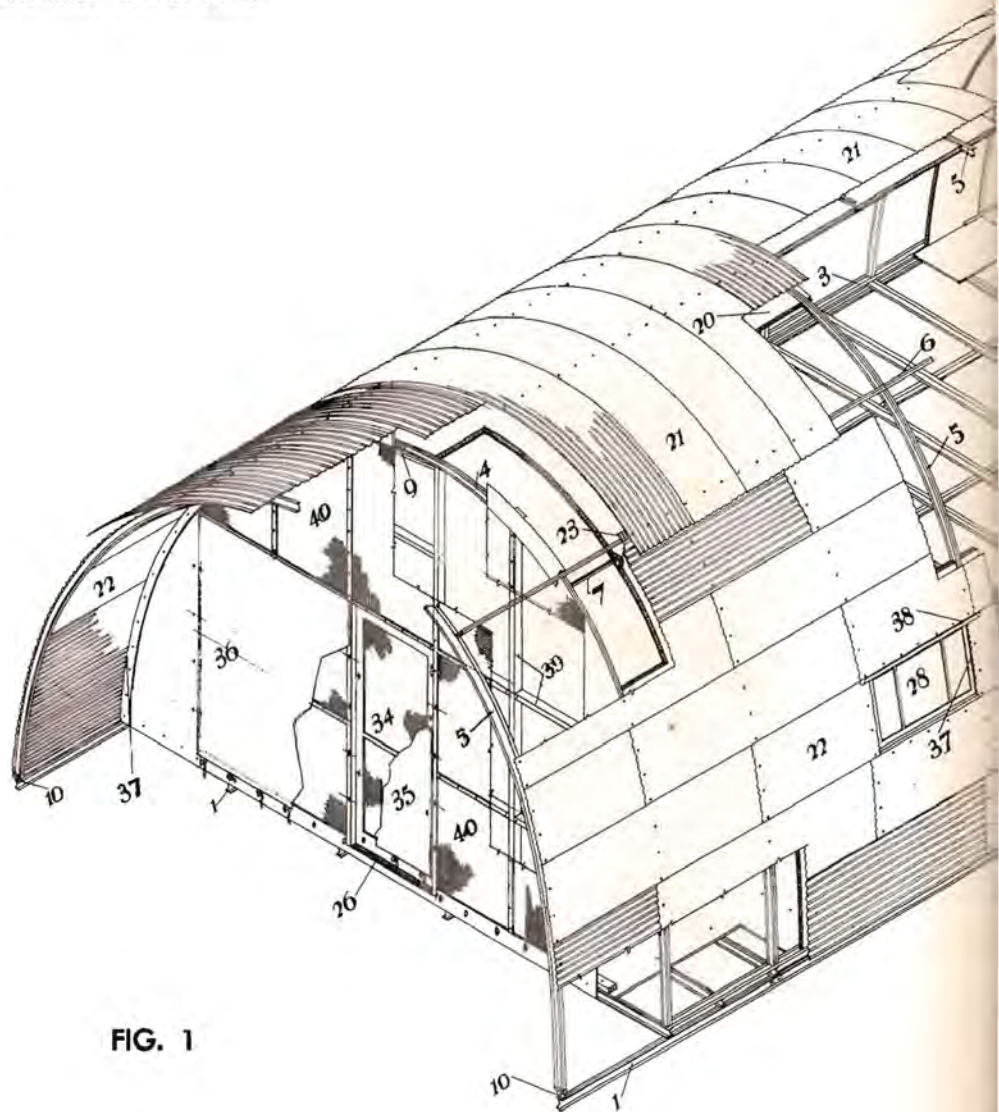
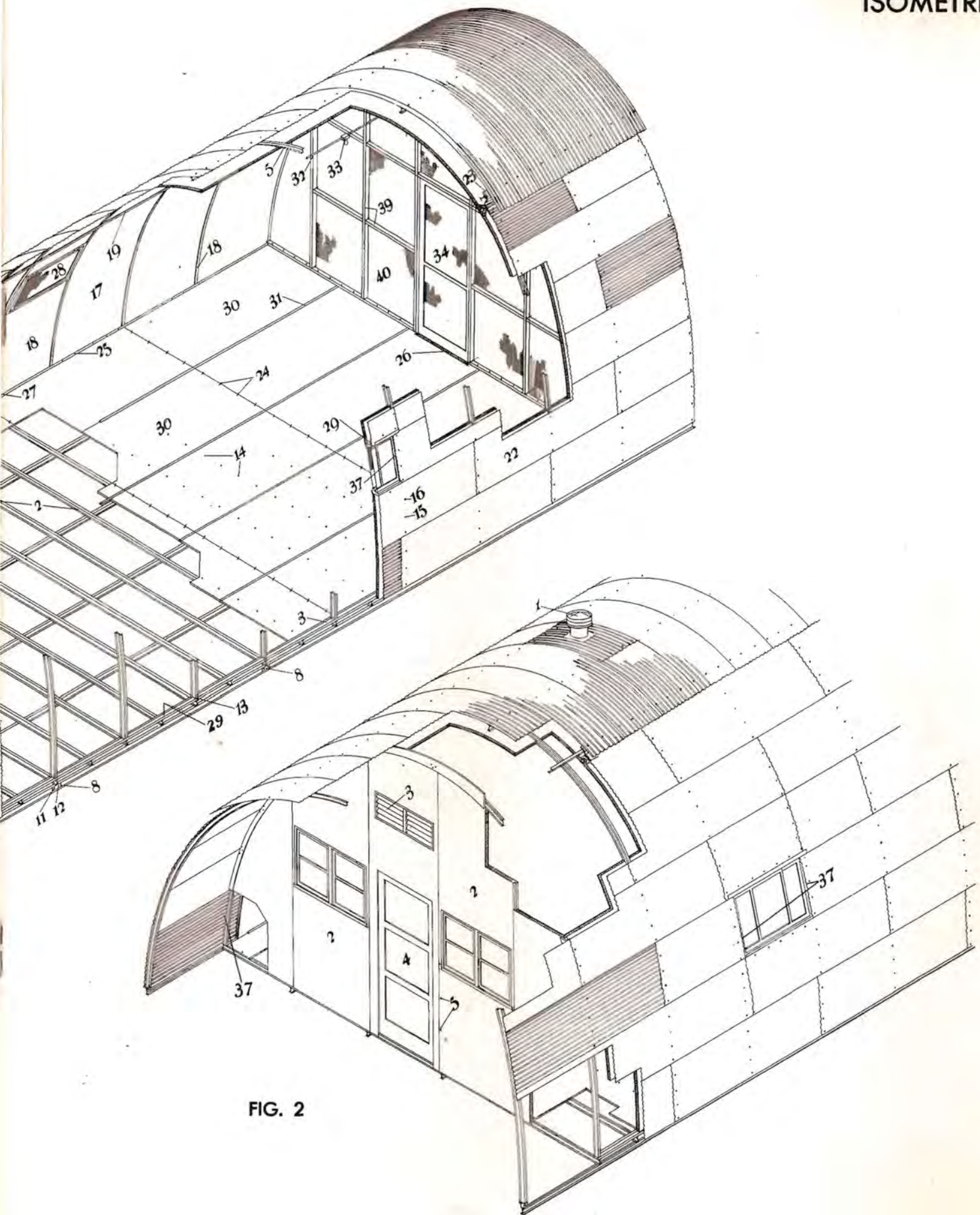


FIG. 1



BASIC UNIT CANVAS BULKHEAD

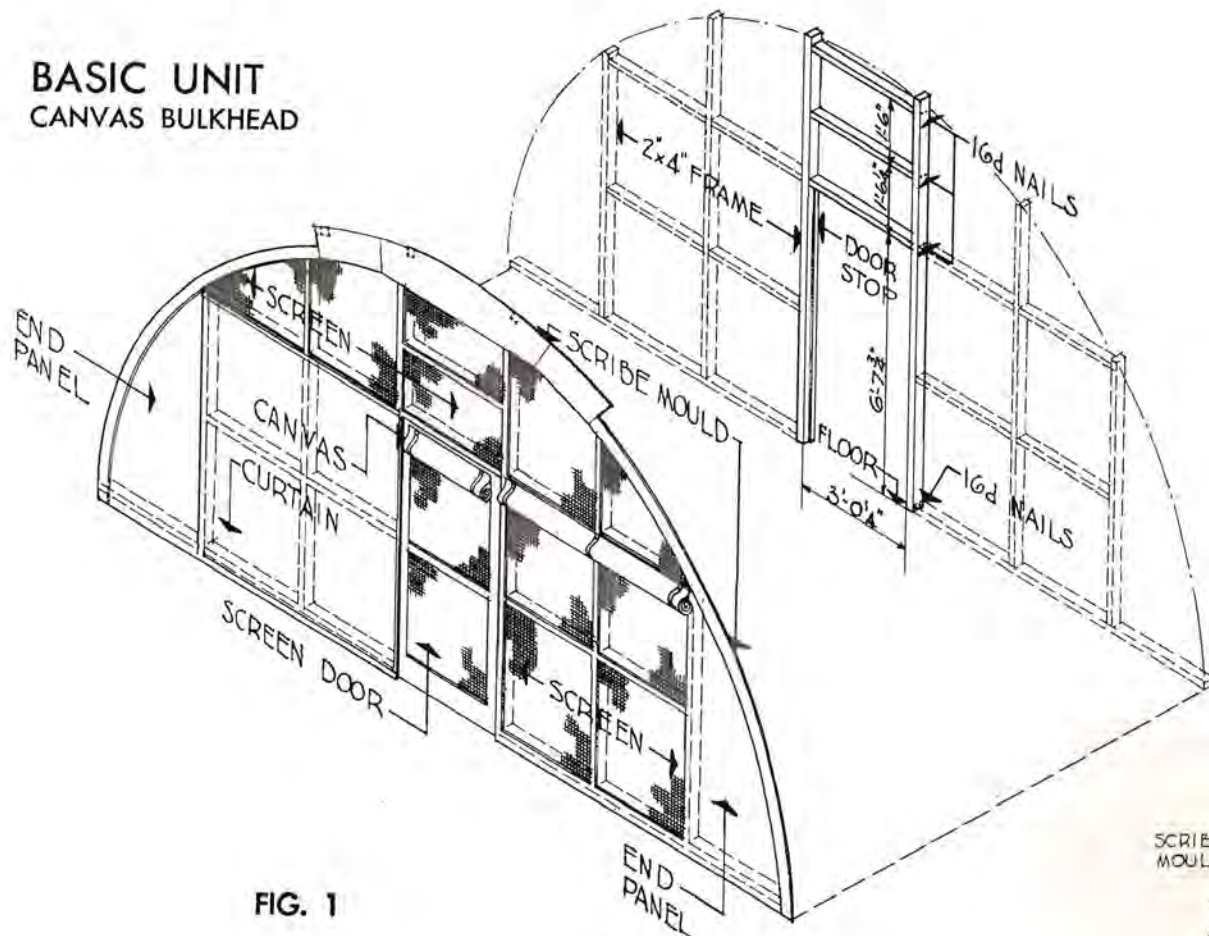


FIG. 1

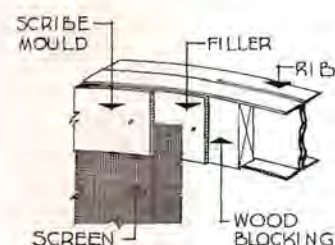


FIG. 2

The Tropical Bulkhead is erected from materials that are cut to size ready to assemble.

1. With 10d Box nails, nail the $\frac{1}{2}$ " x $1\frac{3}{8}$ " wood filler strip (see Fig. 4,) to edge of plywood floor for the width of the hut. Center metal door sill on centerline of hut and screw to floor with holtite screws.
2. Assemble screen door frame on floor of hut before raising. To do this lay the two door jamb studs (2 x 4, 9' 10" long) on edge, space them with the three 2 x 4s 3' 0 $\frac{1}{4}$ " long. Place these in the proper position as door head and bracing members, (see Fig. 1) square frame and nail jamb studs to bracing members with 2 16d nails at each joint. With 6d nails nail $\frac{3}{4}$ " x 2 $\frac{1}{8}$ " door stops around inside of frame, keeping them flush with one side of door-frame. Lay door in frame keeping $\frac{1}{8}$ " clearance all around. Hinges are half surface type, the straight leaf goes between door and jamb, the bent leaf lays on the face of the door. With screws attach hinges at 9 $\frac{1}{2}$ " from top and bottom of door. Wedge door in frame before raising.
3. Raise frame to position so door will be on outside of hut, line outside edge with edge of filler piece and center over door sill. Plumb and brace frame, secure to rib at top by slipping rafter clip over stud, adjusting height until projecting lip of clip rests against rib, then nailing clip to studs and rib with 6d nails. Next lay the two sill plates (2 x 4, 8' 5" long) on the floor, one on each side of the door frame, flush with the outside edge of the filler strip and fitting between the jamb studs and the steel rib. Check to see that door frame is still in position and nail sill plate to joist underneath floor with 16d nails. Nail bottoms of jamb studs to edge of sill plates with two 16d nails each side.

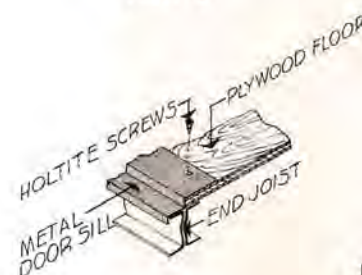


FIG. 3

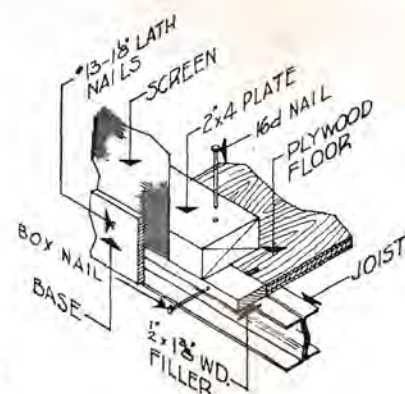


FIG. 4

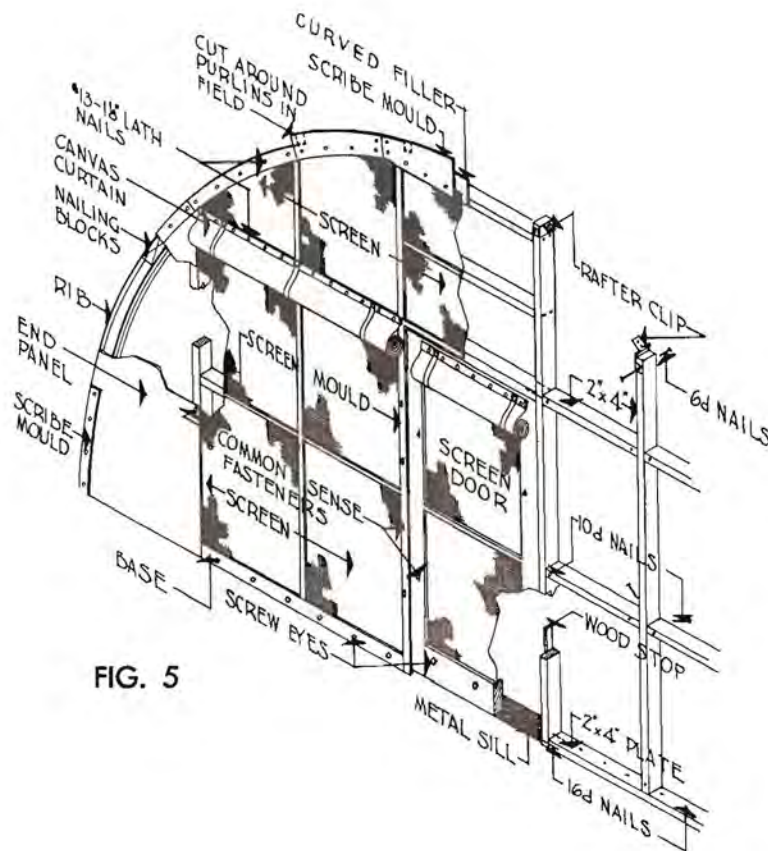


FIG. 5



Place door frame in position



Canvas down



Canvas up

4. Erect the studs and horizontal braces on each side of the door frame (see Figure 1). Space the 2 x 4 studs so the horizontal braces (2 x 4, 2' 7 $\frac{3}{8}$ " long) will fit between them. Toe-nail the studs to the 2" x 4" sill plate with 10d nails at the bottom, and fasten them to the rib at the top with rafter clips. Toe-nail the horizontal braces to the studs with 10d nails, line one of these braces with the head of the door frame and space the other midway between door head and sill plate.
5. Nail the curved filler (3 $\frac{5}{8}$ " wide) see Fig. 5. to the wood blocks in the rib. These follow the rib curve from one end stud around the top to the other end stud.
6. Cut screencloth to fit the panels and transom on each side of and over the doorway. Stretch the screen and fasten it to the 2 x 4s and filler with No. 5 staples.
7. Nail the two end panels to the end studs and the blocking in the rib with 1 $\frac{1}{8}$ " lath nails.
8. Apply the exterior scribe mold. First fit the three pieces at center top, notching them for the purlins. Continue around hut with 3 $\frac{5}{8}$ " wide curved scribe molds, fit tight against roof and nail with 1 $\frac{1}{8}$ " lath nails.
9. Nail base and wood screen mold to 2 x 4s with 1 $\frac{1}{8}$ " lath nails.
10. Nail canvas door curtain to top rail of door and canvas side curtains to the top horizontal brace with lath nails. Cover this nailing with wood screen mold. Allow curtains to hang, stretch and locate position of common sense fasteners at the sides and line the screw eyes at bottom with the tie straps on the curtains.
11. Attach latch set to door through hole in door. Place door knob on outside and box with handle inside. Install keeper on edge of door stop opposite lock bolt.

BASIC UNIT ELECTRICAL SYSTEM

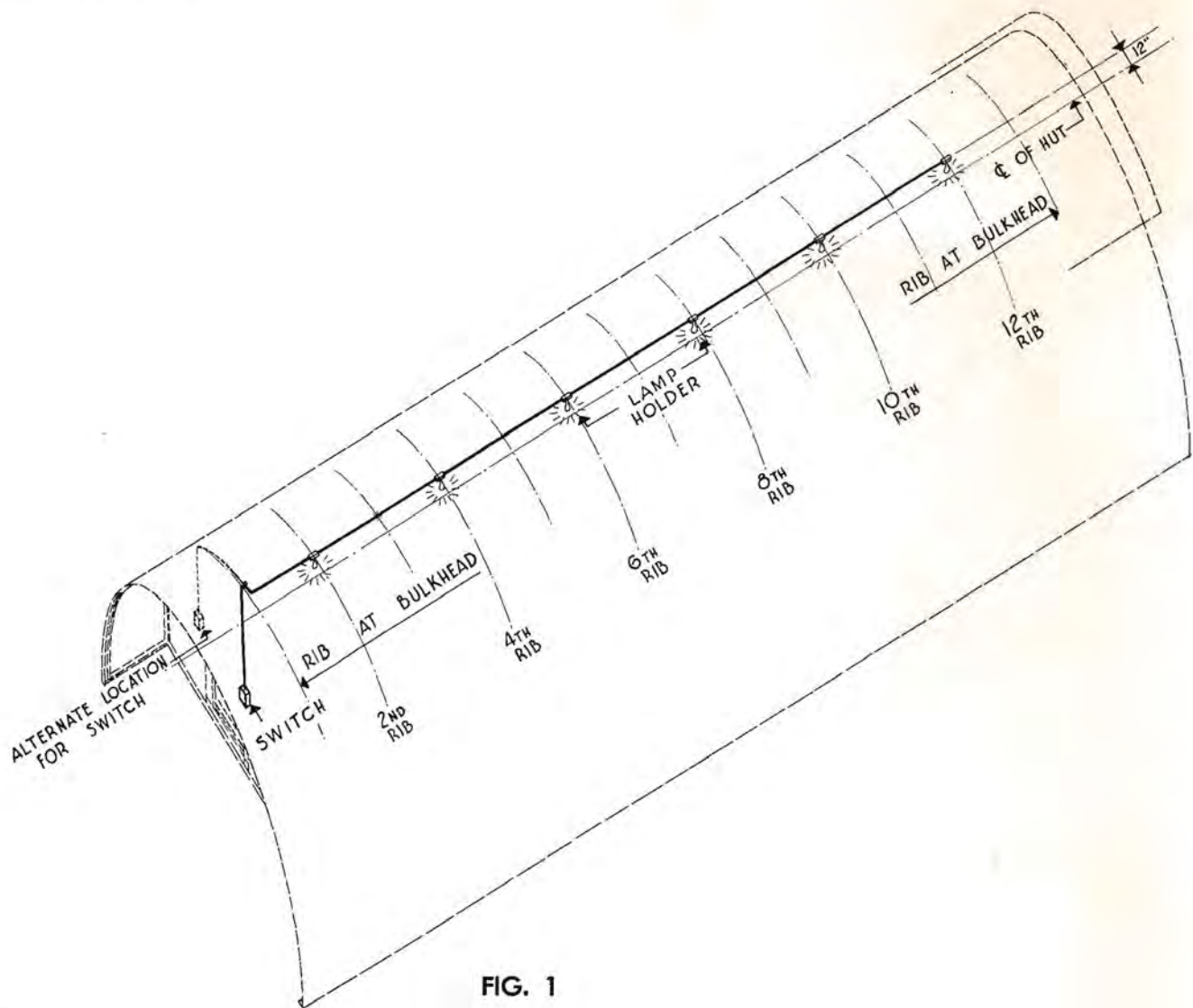


FIG. 1

The electrical system consists of a lighting circuit extending lengthwise at the top of the hut, one foot off center toward the service side of the hut, with a switch at or near the doorway at the service end of the hut.

1. To install remove the cover from the switch box and fasten the box to a wood mounting block on the latch side of the door frame at the service end of the hut. (See Fig. 3.) (Where the use of the hut requires additional switches group all switches between the window jamb and the wall of the hut on a mounting board 4' 5" above the floor. This permits the most practicable use of the service leads.) (See Fig. 4.)
2. Fasten the Romex cable to the Masonite with cable clamps spaced approximately 3 feet apart, starting 3 inches from the switch box, and continuing so as to include cable clamps attached to the Masonite approximately 1½ inches from either end of all lampholders and one cable clamp spaced midway between all lampholders. (See Fig. 2.)
3. The lampholders shall be independently secured to the Masonite through the use of 2 screws for each.
4. Switch box, cable clamps and lampholders to be attached by means of sheet metal screws.

BASIC UNIT ELECTRICAL SYSTEM

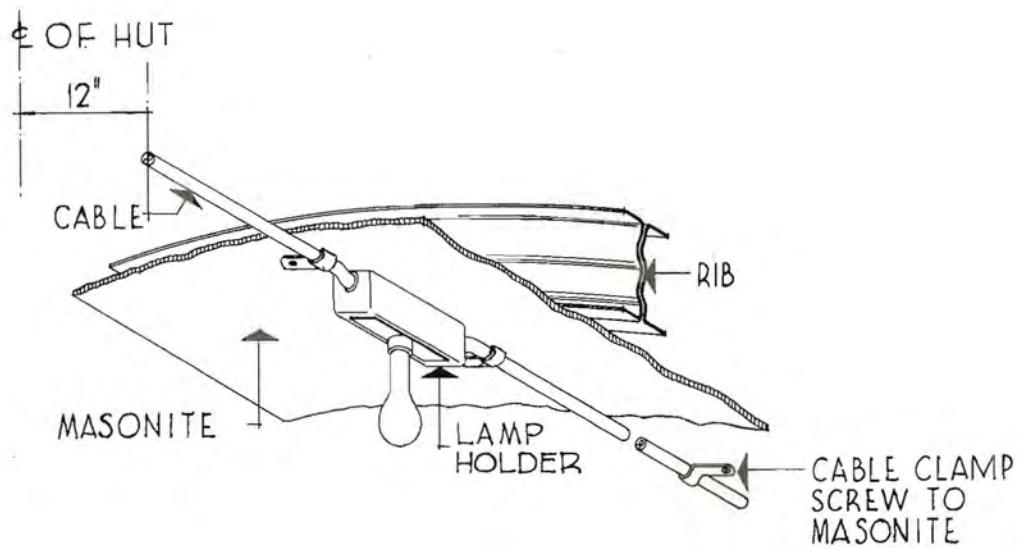


FIG. 2



Fasten box to door jamb



Clamp to ceiling

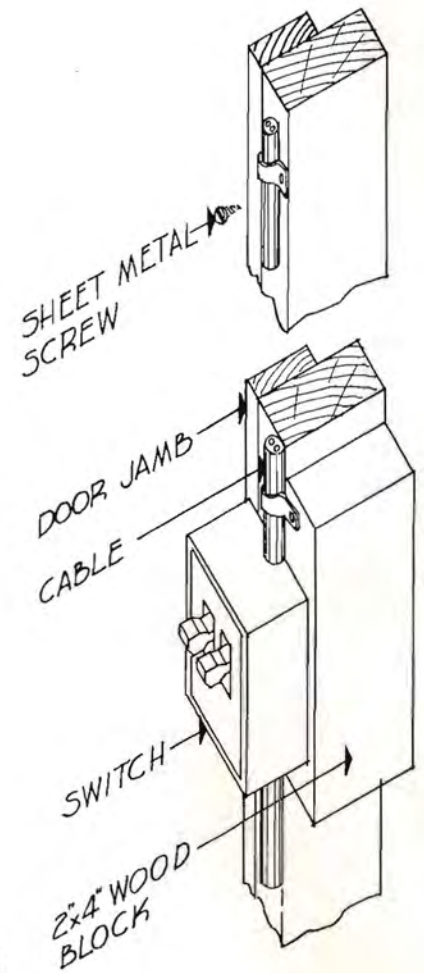


FIG. 3

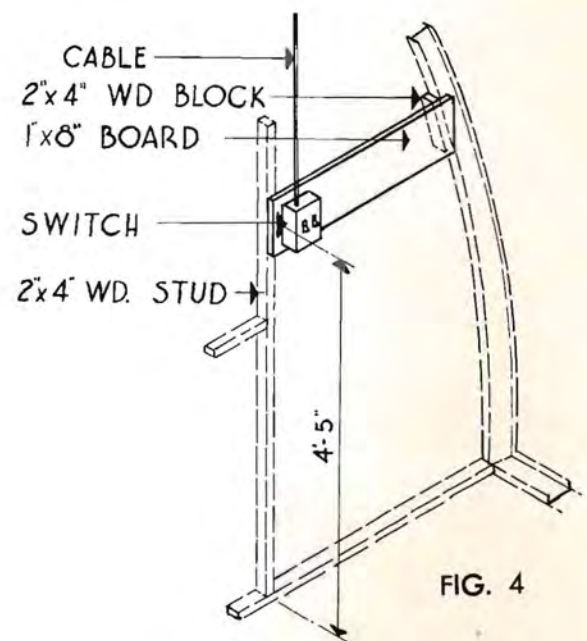


FIG. 4

ADAPTATIONS PLYWOOD BULKHEAD

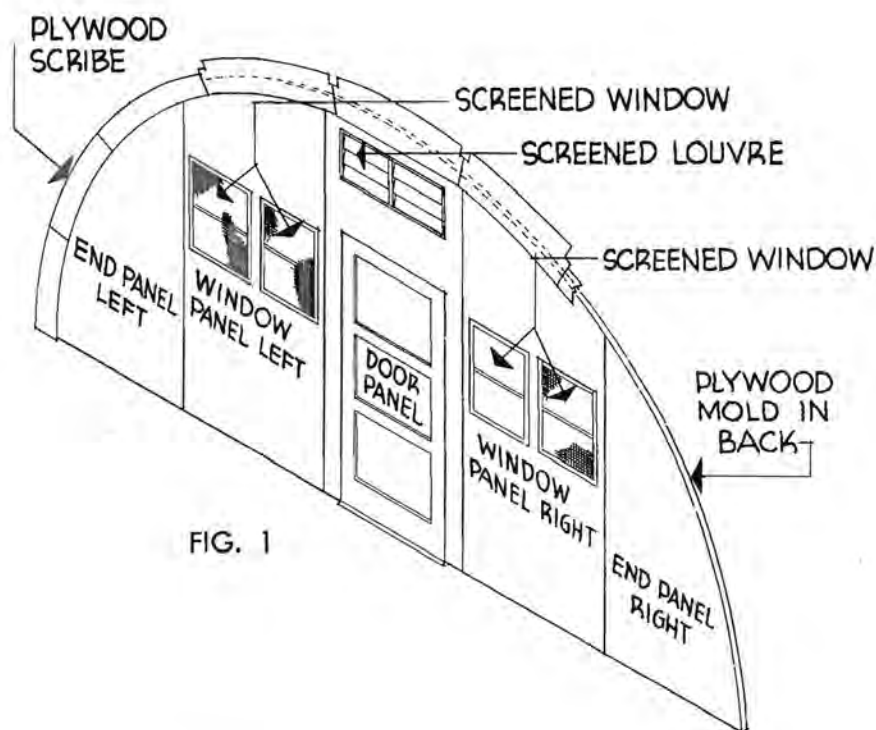


FIG. 1

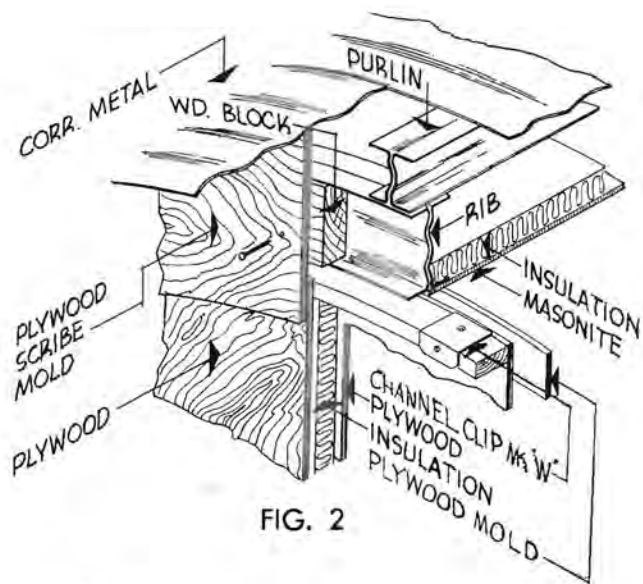


FIG. 2

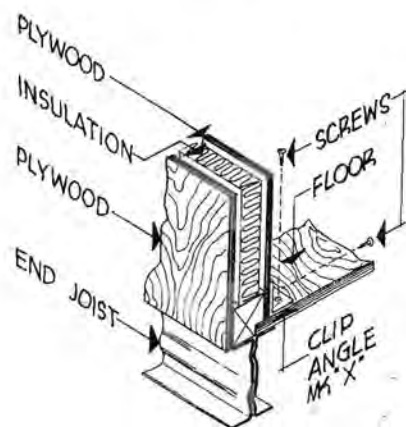


FIG. 3

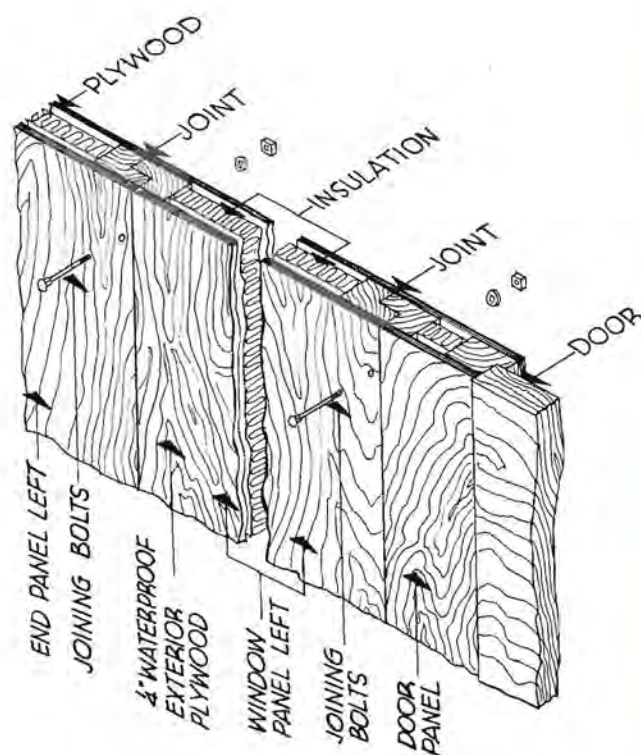


FIG. 4



Interior of bulkhead

Photograph 38



Complete bulkhead

Photograph 41

The Plywood, or Northern, Bulkhead is furnished in five sections—2 end panels, 2 window panels and a door panel. These panels connect to each other by means of bolts and to the floor and end rib by means of clips. (See Fig. 1.)

1. Before setting any of the bulkhead panels in place, nail the clips marked "W" to the underside of the end ribs (See Fig. 2). Place these at the center of the 2nd, 3rd, 4th, 5th, and 7th wooden blocks in the ribs counting from the splice plate down. With the "W" clips in place, set up the panels temporarily, starting with the door panel #1, followed by the window panels, and then the end panels.
2. When all five panels are thus temporarily placed, bolt them together. (See Fig. 4.)
3. Then secure Bulkhead to the floor by means of the clips marked "X" screwed to the floor and to the panels. (See Fig. 3.) Attach the clips about 2" from each side of the door panel and 7" from each side of the outer panels. Finally, nail the top end of the panels to the "W" clips.
4. After the panels have been set in place, fasten the metal door sill to the floor by means of holtite screws (See Fig. 3, page 20).
5. Nail the plywood scribemold to the blocking in the end rib. Start nailing these pieces from the top center, working each way. Install the interior plywood scribemold in similar manner, but nail it to the panel itself.

ADAPTATIONS

VENTILATORS AND SMOKE STACKS

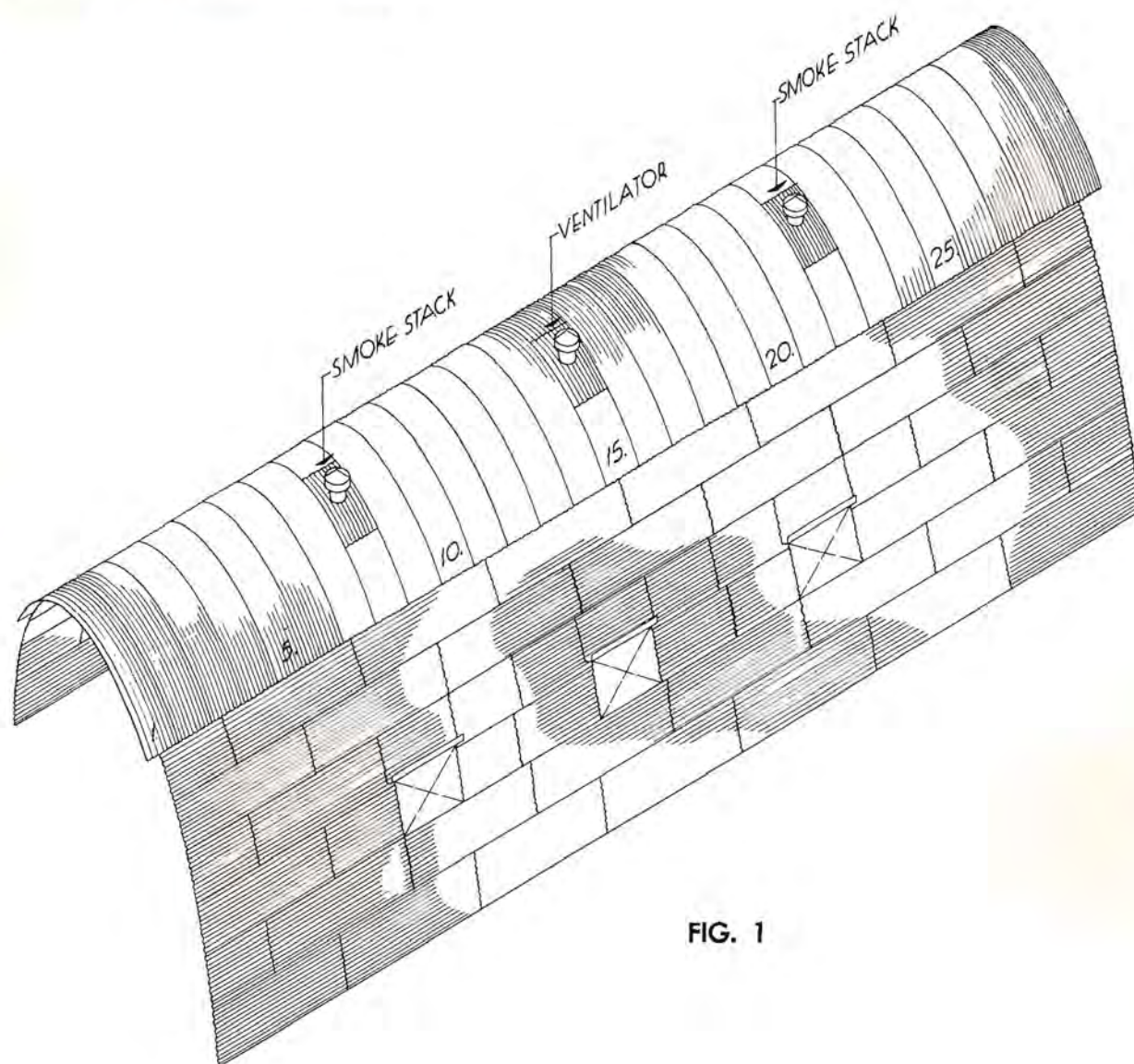


FIG. 1

For huts requiring stoves two (2) smoke stacks and a ventilator are furnished. These are shipped knocked down with curved flashing sheets for attaching them in place.

1. Assemble the smoke stacks and ventilator. (See figures 2, 3, 4, 5, 6 and 7.)
2. Lay and center curved flashing sheet (with hole and attached collar) over curved top sheet (see item 6, page 17) wherever ventilator or smoke stack is required. Mark location of holes on curved top sheet.
3. Cut hole in masonite, insulation and curved top sheet. Line hole in curved flashing sheet with this hole and nail sheet.
4. Fit inner sleeve through this hole and screw the flange to the Masonite with holtite screws. Slip ventilator over the collar on flashing sheet and secure to it by means of holtite screws. For the smoke stack the adapter ring or hood must first be placed over the collar on the flashing sheet and screwed to it. Then slip the smoke jack over the hood and fasten it with holtite screws.

ADAPTATIONS VENTILATORS AND SMOKE STACKS

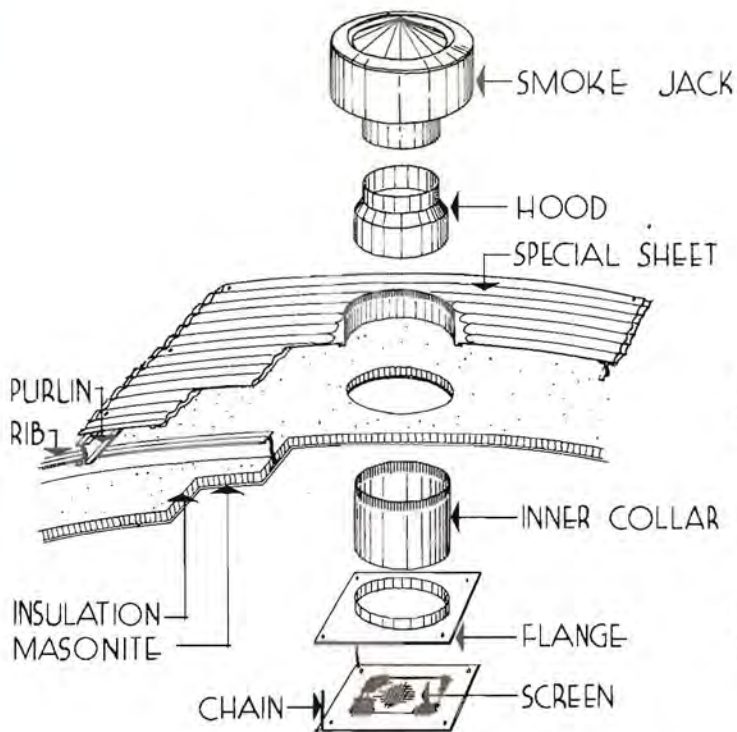


FIG. 2

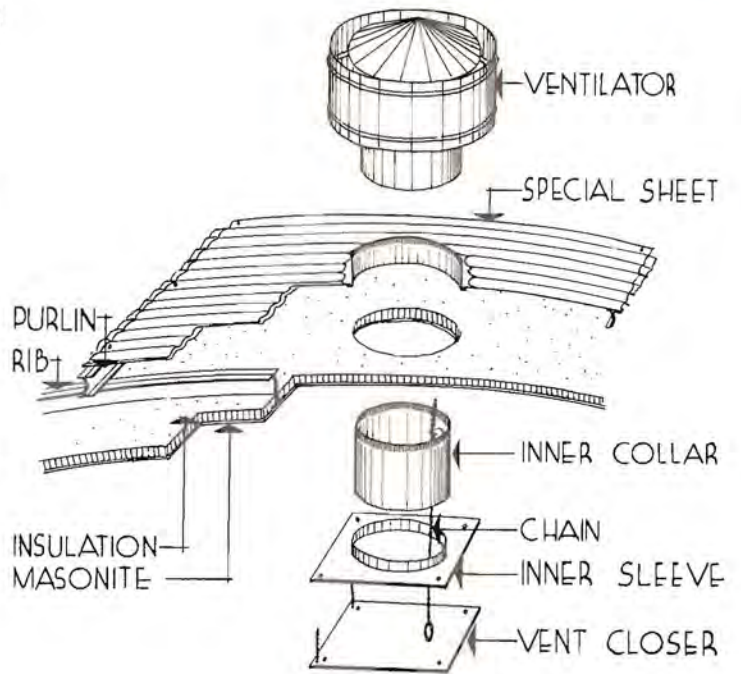


FIG. 5

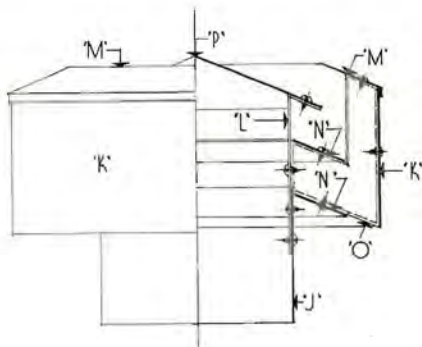


FIG. 3

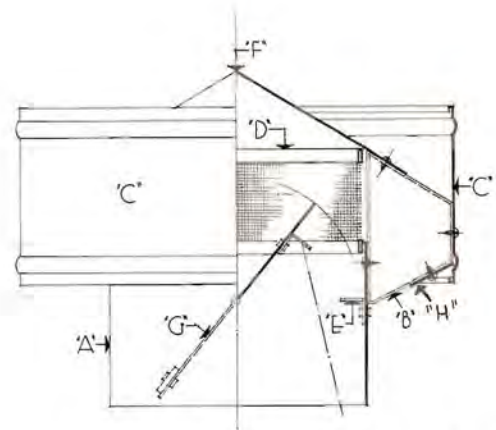


FIG. 6

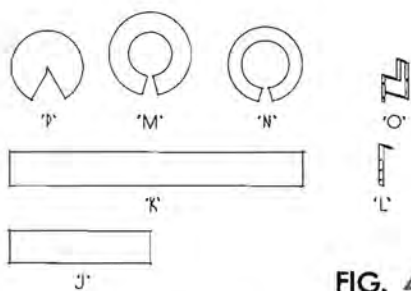


FIG. 4

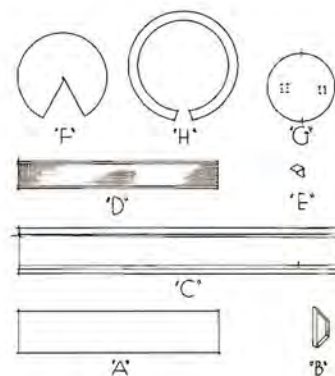


FIG. 7

FIG. 2, 3 AND 4 SMOKESTACK

FIG. 5, 6 AND 7 VENTILATOR

ADAPTATIONS CONTINUOUS VENTILATOR

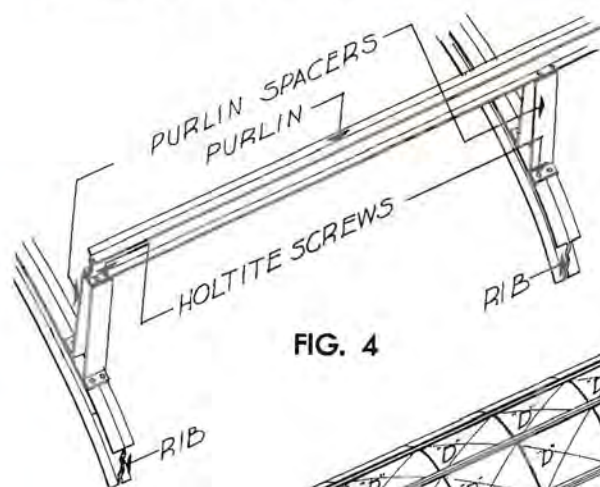


FIG. 4

FIG. 1

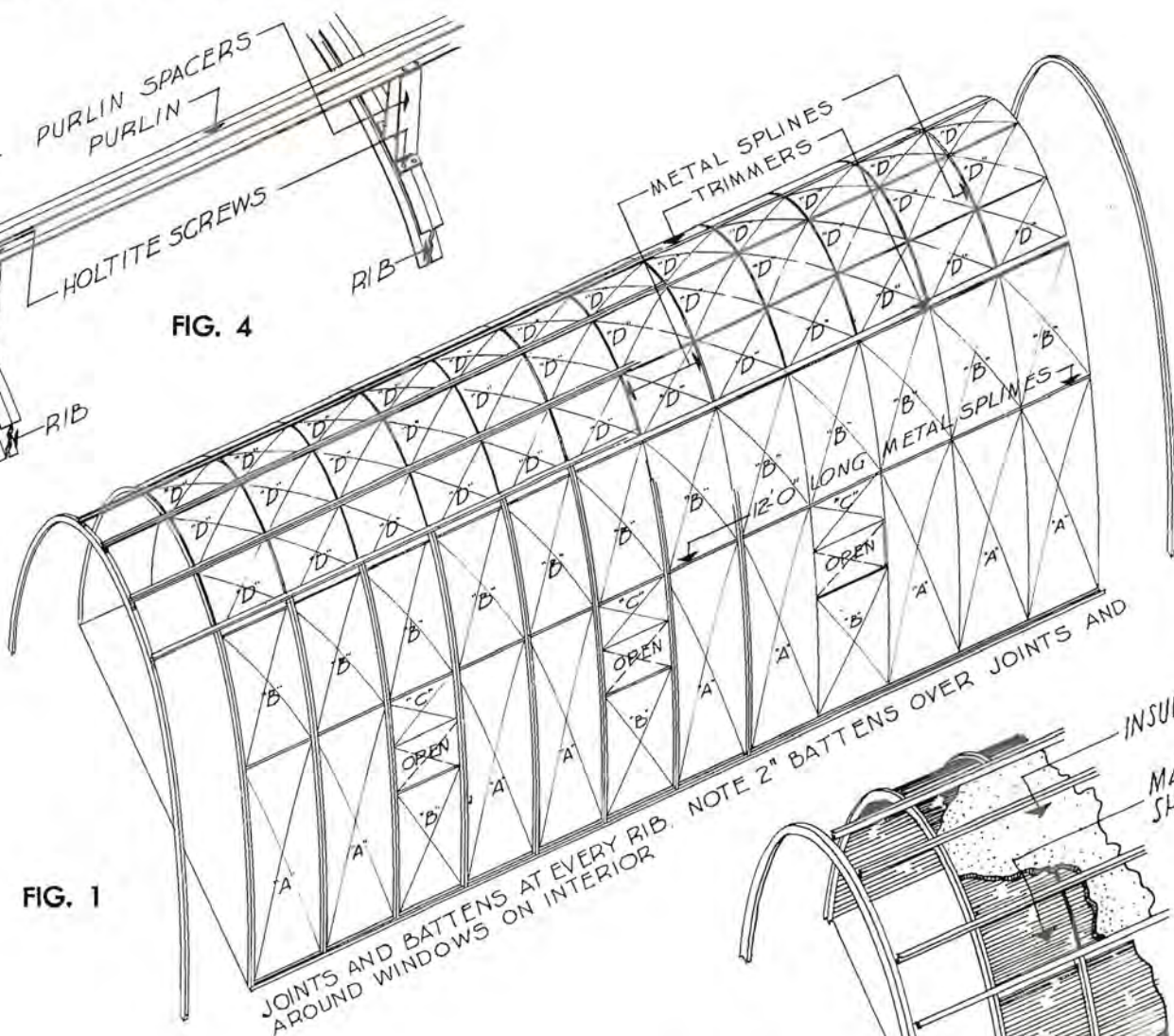


FIG. 2

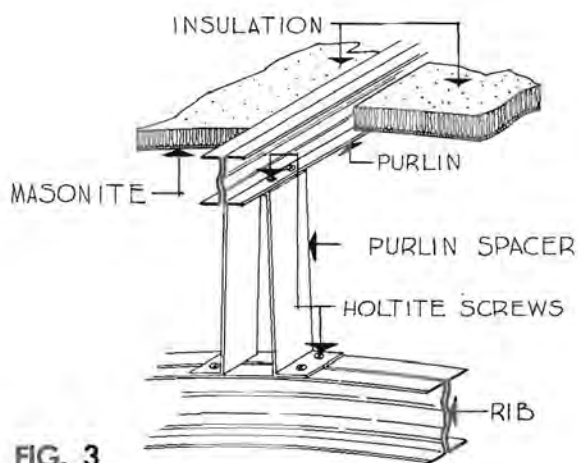
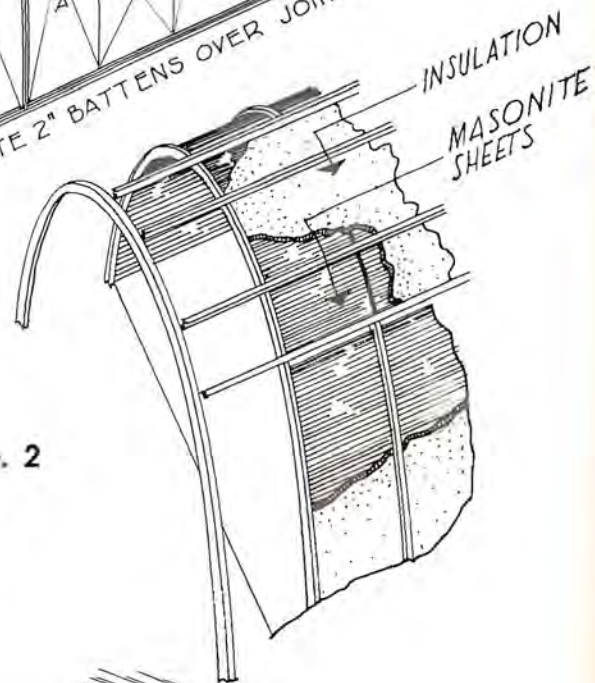


FIG. 3

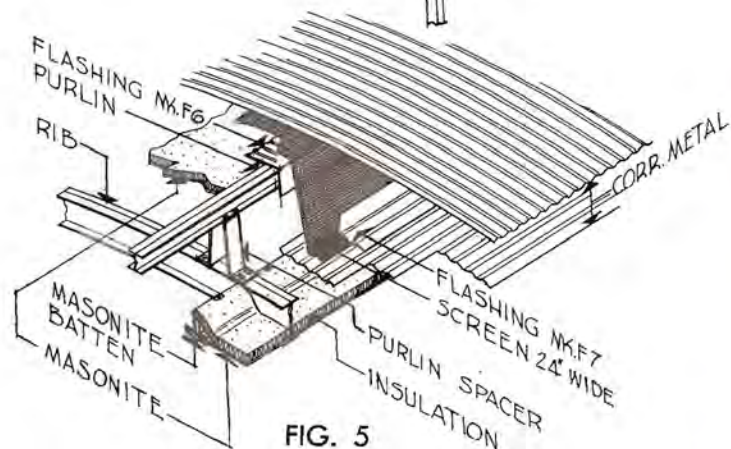


FIG. 5

ADAPTATIONS CONTINUOUS VENTILATOR

For tropical huts requiring additional ventilation the top of the hut may be raised to form a continuous ventilator.

1. Erect the frame as outlined on pages 4, 5, 8, 9, 10 and 11 with this exception: the purlins are raised from the ribs by purlin spacers. There are four, 9" high x 2" wide spacers per rib, one for each purlin, and these are first screwed to the ribs at the location the purlins normally occupy. The purlins then are placed on top of the spacers and screwed to them. (See Figs. 3 and 4.)
2. Install inside covering as outlined on pages 12 and 13 with the following exception: do not cut 12 Masonite sheets Mk. "D" down in size. All "D" sheets (36) will be used as shipped. The tops of the "B" sheets are to be nailed to the trimmers and no splines are to be used at this point. Instead using 6d nails nail a 2" wide Masonite batten at the edge of the sheet, lining it with the edge of the steel trimmer. (See Fig. 5.) The three rows of Masonite sheets Mk. D. at the top of the hut will rest on the lower flanges of the raised purlins. Into the joint between sheets fit a short piece of spline so that it lays from purlin to purlin. Cut these short splines in the field from the 12' 0" splines not used in the remainder of the hut.
3. Stretch and lay the insulation as described on pages 14 and 15. After this is done cut the insulation from between the two trimmers at the top of the hut but leave enough margin at each side (2") to turn under and nail to the top of the half stud trimmers (see Fig. 5) with $\frac{7}{8}$ " roofing nails. Take the pieces of insulation cut from between the trimmers and use them to lay over the raised portion of the inside covering.
4. Install the corrugated sheets on each side from the plate up to the lower purlin as described on pages 16 and 17.
5. Install the flashing and screen. Nail the top piece of flashing strip Mk. F-6 to the top of the lower purlin. Use common nails as this piece will later be covered with the curved roofing sheets. (See Fig. 5.) Lay the screen so that one edge laps the corrugated iron side sheets (horizontal corrugations) and hold by covering with flashing strip Mk. F-7. Nail this strip to the ribs with double-headed nails and washers and screw to sheet below with two sheet metal screws between ribs. Then stretch screen over top of F-6 flashing and nail to purlin. Allow excess screen to lay on insulation. Note—Flashing and screen is continuous between bulkheads only.
6. Install the curved roofing sheets as outlined on pages 16 and 17.
7. Electrical work is installed as described on pages 22 and 23. Since the ribs are exposed in the top portion of the hut, secure the lampholders directly to the ribs by means of the metal mounting cleats included in the electrical kit. (See Fig. 6.) Eliminate the cable clamps at each end of the socket and nail the intermediate cable clamp directly to the rib. (See Fig. 7.)



Nail "B" sheets to trimmers



Screen in place

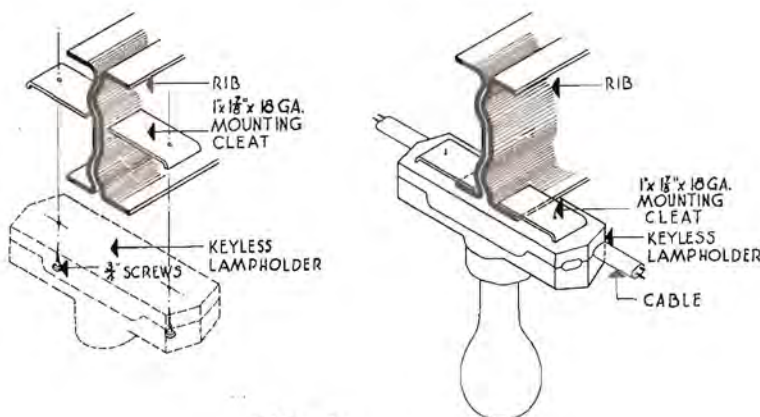


FIG. 6

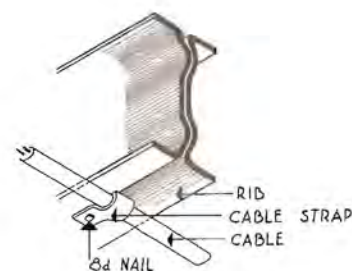


FIG. 7

ADAPTATIONS BOTTOM VENTILATORS

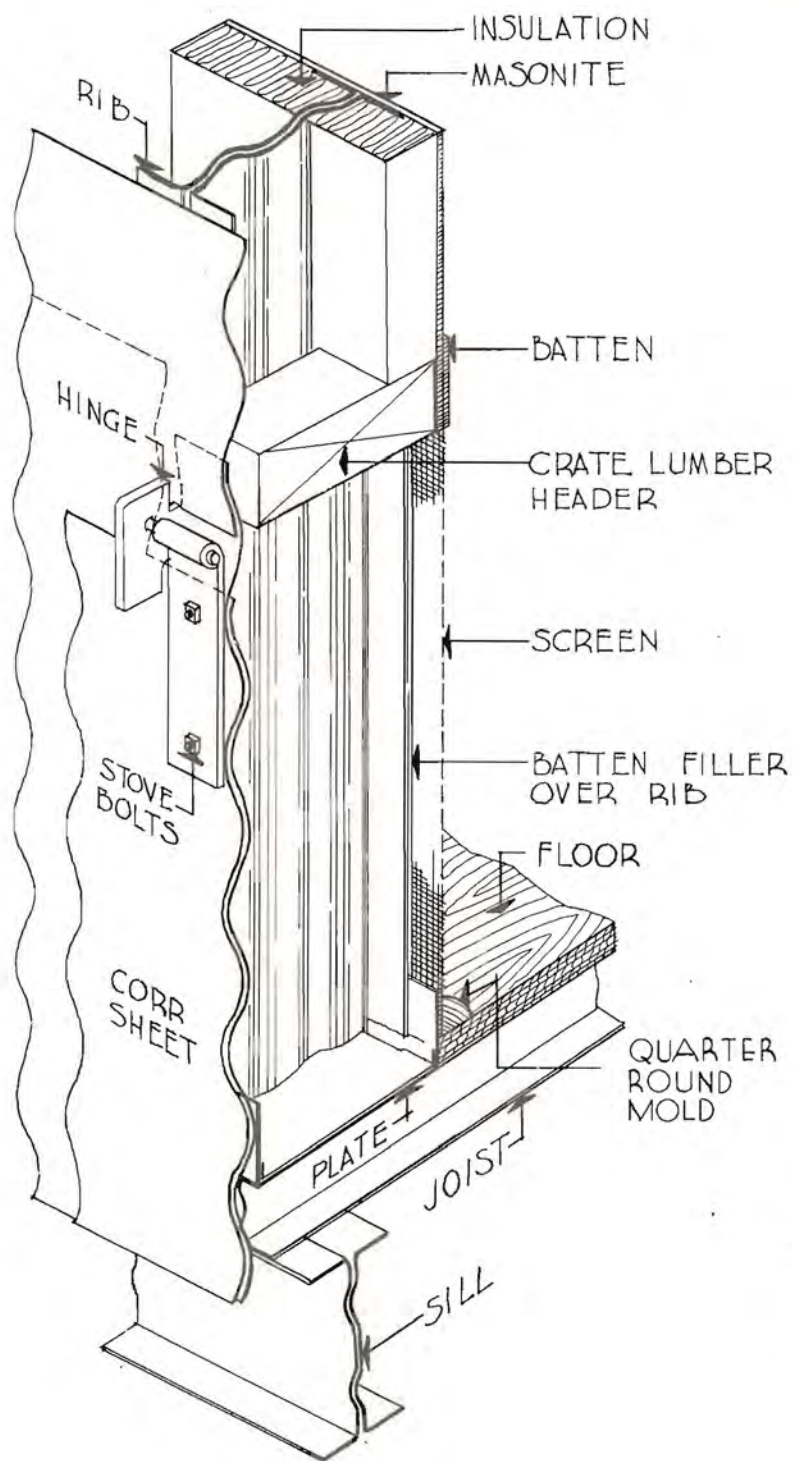


FIG. 2

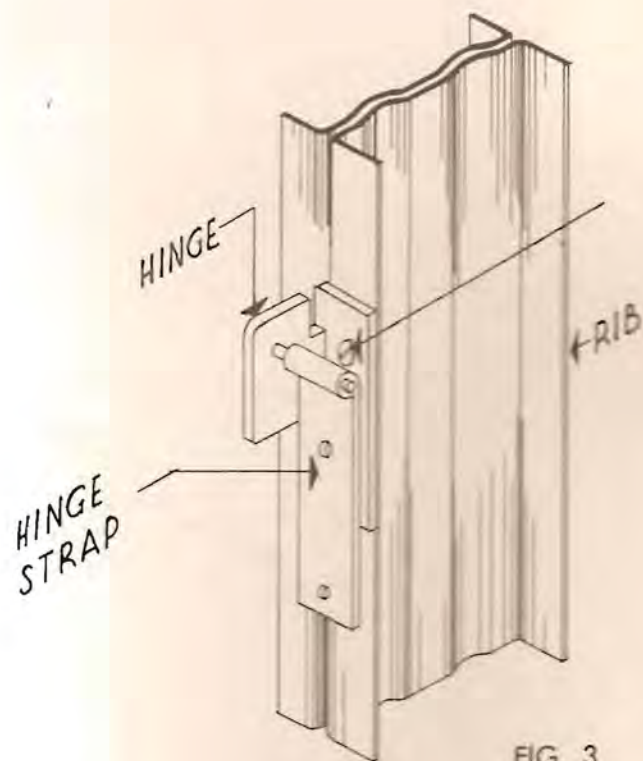


FIG. 3

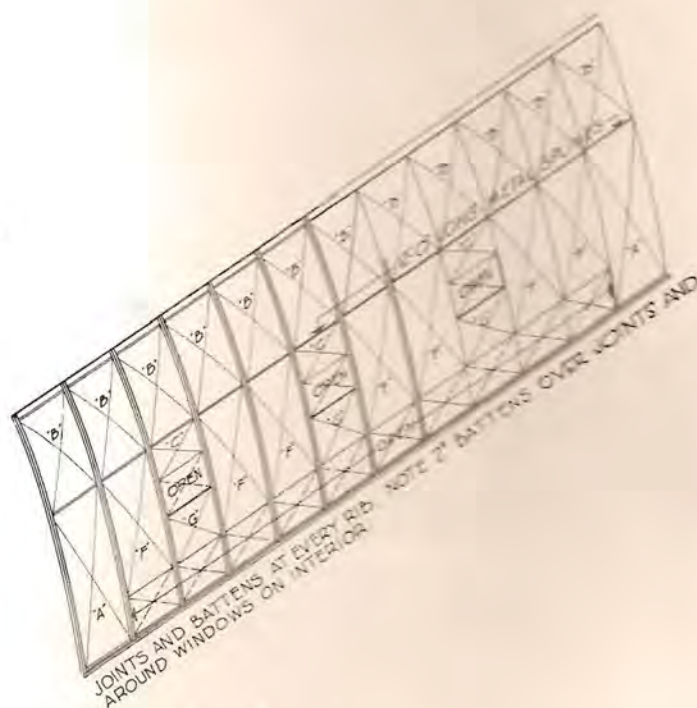


FIG. 1

ADAPTATIONS BOTTOM VENTILATORS

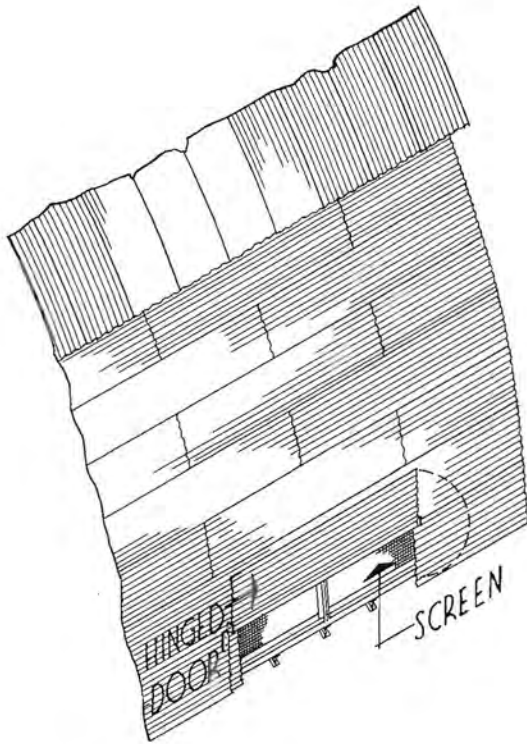


FIG. 4



Hinge bottom row of sheets

Photograph 52



Install screens in openings

Photograph 48

NOTE: Bottom corrugated sheets are omitted to show hinged door and screen.

For tropical conditions requiring extra ventilation the hut may be adapted for screened openings along the bottom of the building.

1. Make tops of ventilator openings out of crating lumber. Fit these between flanges of ribs and secure by nailing through flanges into wood with 6d nails. (See Figure 2.)
2. Before installing the inside covering take 14 sheets of Masonite Mk. "A" (3' 11 $\frac{7}{8}$ " x 8' 0"), cut them to 3' 11 $\frac{7}{8}$ " x 6' 3" and Mk. them F. Also cut 6 sheets Mk. B (3' 11 $\frac{7}{8}$ " x 4' 0") to 3' 11 $\frac{7}{8}$ " x 2' 3", mark these G. Then install inside covering as described on pages 12 and 13 except substitute previously cut "F" sheets for "A" sheets where shown in Figure 1 and use previously cut "G" sheets for "B" sheets under windows (determine window height as before using uncut "B" sheet.) (See Figure 1.)
3. Roll up surplus insulation between each rib and let roll rest on wood header, leaving clear opening below.
4. Place the starting row of corrugated sheets under the windows nailing temporarily at top of sheets. (See item 1, page 17.) In the bottom row of sheets, the second sheet from each end of the hut may be hinged for ventilation. This sheet is attached to the ribs with a hinge at each end of the sheet. Place this hinge so that lower edge of corrugated sheet above fits tightly into notch in hinge, punch rib and bolt hinge to rib with stove bolts.

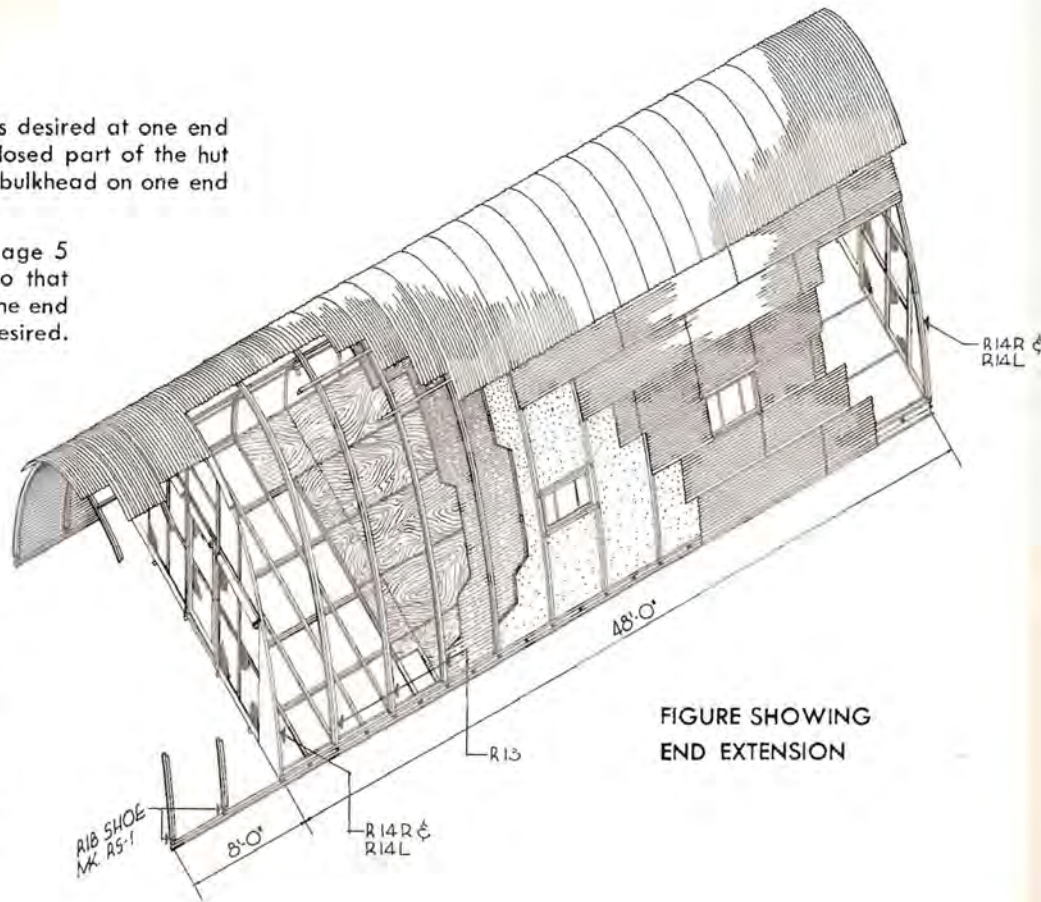
Apply all the sheets in the bottom row that are not hinged, notching those that interfere with the hinges. (See item 3, page 17.) To attach the sheets that are hinged, cut these sheets to 25 $\frac{1}{4}$ " in width and notch them for the hinges. Lap them under the starting row above one-half corrugation. Make sure the corrugations in these sheets mesh with those of the sheets above and on each side, then slip hinge straps over hinge pins and bolt the straps to the sheets with stove bolts. (See Figure 2.)

5. Install the screen in the opening, tack the top edge through the Masonite into the wood header with $\frac{7}{8}$ " roofing nails. Tack the lower edge to the floor and cover it with the quarter-round mold.

ADAPTATIONS END EXTENSION

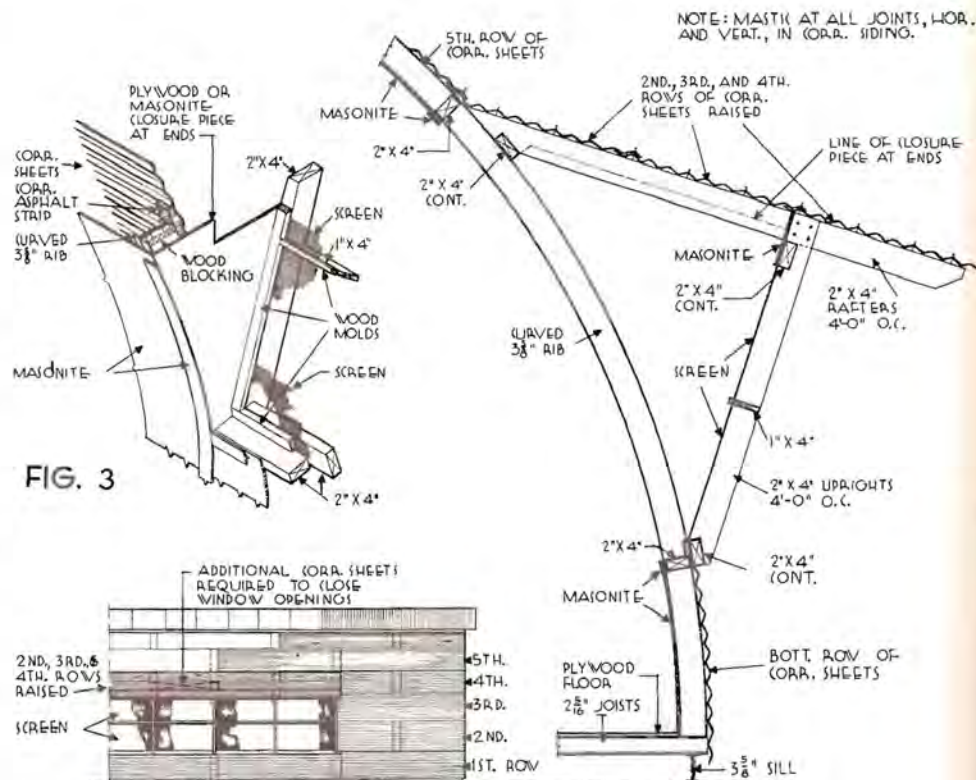
In some instances a longer overhang is desired at one end of the hut. To accomplish this, the enclosed part of the hut is shifted 4' 0" on the sills so that the bulkhead on one end is attached to the end rib of the hut.

1. Set the joist sills as outlined on page 5 except place interior joist sills so that the ends of all sills are in line on the end of hut where no overhang is desired. Start the joists at this end, placing the first joist at the end of the sills, then spacing them at 2' 0" intervals. Use hand punch to punch holes in the sill for the second joist. At the other end of the outside sills there will then be an 8' 0" space where no joists occur. At the ends and 4' 0" from the ends of these sills attach the rib shoes Mk. R S 1.
2. Erect ribs as before, being careful to locate the ribs with the wood blocking where the bulkheads will occur. Turn these ribs so the wood blocks face outward.
3. Follow previous instructions for erecting balance of hut.



ADAPTATIONS SIDE OPENING

When additional light and ventilation are necessary, openings in the side of the hut may be provided. To do this erect the hut as before outlined, but instead of installing the windows, construct a supporting frame of wood as shown in Fig. 2. Cut the inside covering to the framed opening and support the 2nd, 3rd and 4th rows of corrugated sheets on the wood rafter thereby forming a lean-to roof. The resulting openings should be screened and the end of the openings should be closed with salvaged Masonite or plywood. (See Fig. 3.) The drawings are intended as suggestions to show how the above may be erected. Necessary additional material to that furnished with the hut consists of framing lumber, screen cloth, six 27 1/2" x 56" corrugated sheets and miscellaneous nails and staples.



ADAPTATIONS WOOD STILT FOUNDATION

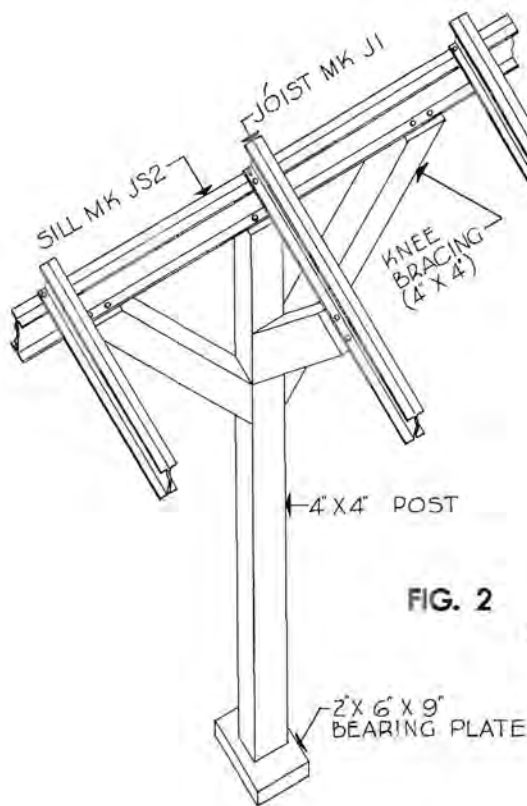


FIG. 2

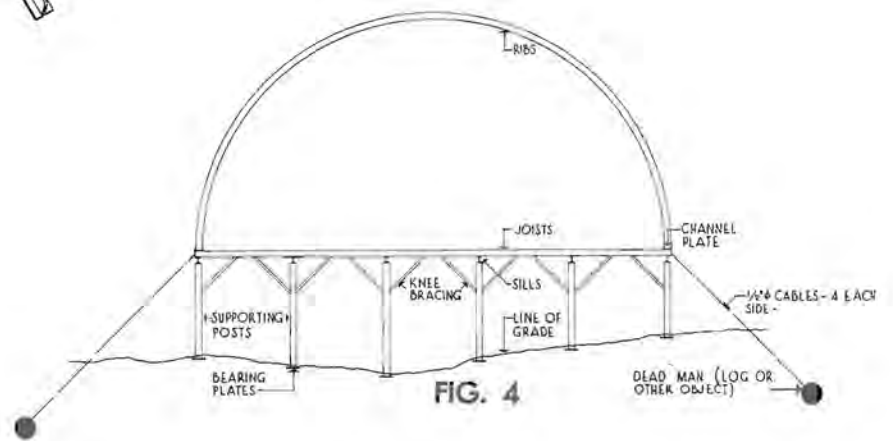


FIG. 4

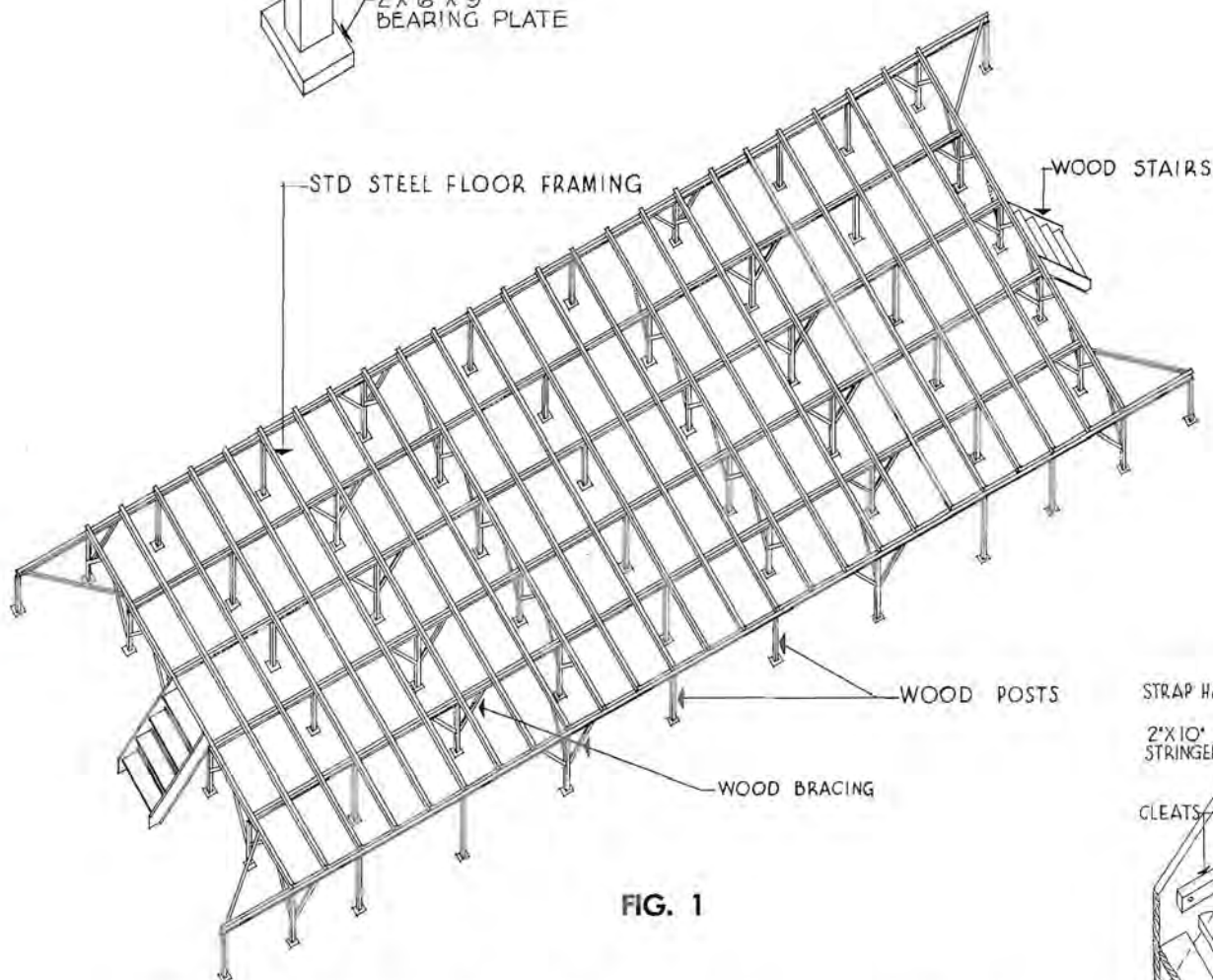


FIG. 1

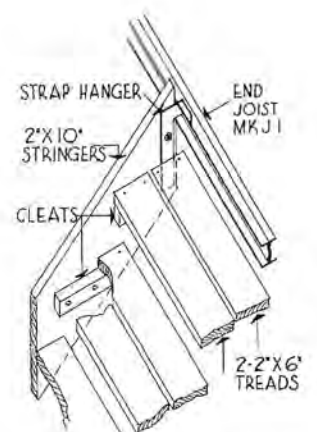


FIG. 3

Although materials for this work are not furnished it is suggested that for conditions under which the ground cannot be conveniently levelled, wood posts may be used to level the hut. See sketches on this sheet for suggestions.

ADAPTATIONS

SIDE DOOR

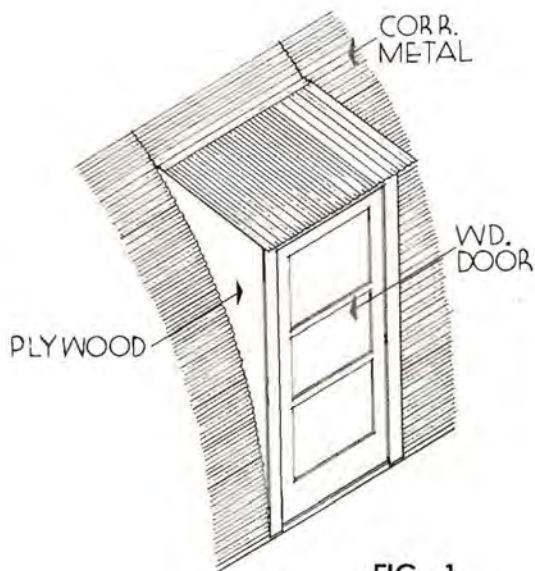


FIG. 1

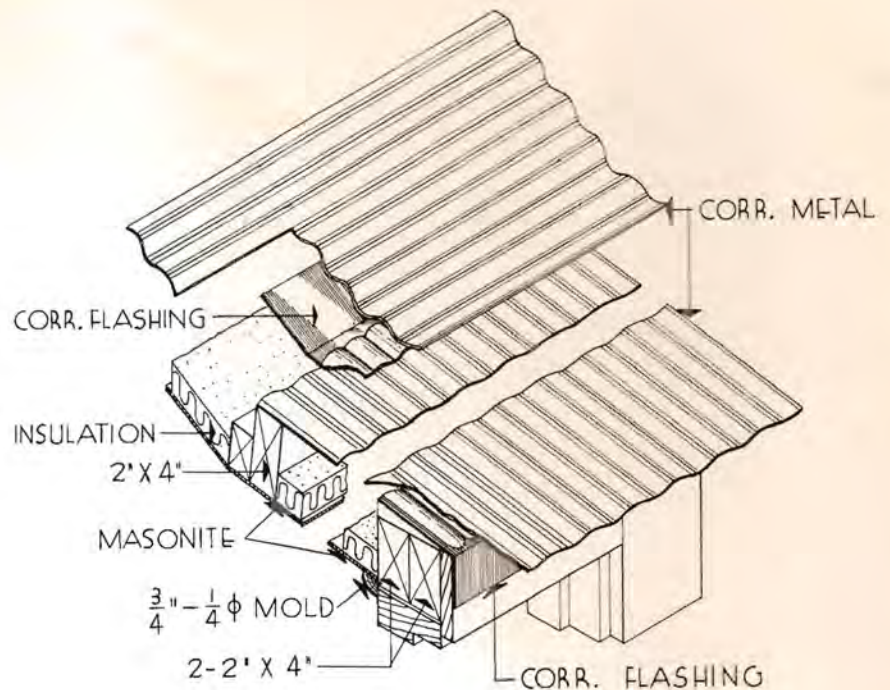


FIG. 3

Determine location of side door.

Remove (or omit) channel plate, corrugated iron siding, insulation, inside covering, shoe mold and depending on door location, the window.

Carefully cut the 108" corrugated sheets along the inside edge of each rib to provide for nailing the sheets to the ribs. Before nailing the corrugated siding, install the flashing sheets between the corrugated hut siding and the plywood siding of the doorway.

Erect the 2 x 4 framing for the door opening and roof. Bend two (2) 2 x 4's along the ribs each side of opening. This can be accomplished by making saw cuts across the 2 x 4, 2" apart and $\frac{3}{4}$ " deep, then bend to radius.

Nail masonite to frame, using salvaged masonite—cut to fit.

Install sill (Fig. 2) using crating lumber blocks nailed to the floor joists. Screw sill to blocks and floor with holtite screws.

Place insulation over ceiling and sidewalls, using salvaged insulation.

Nail plywood sides, door trim and trim along edge of roof at each side, using crate lumber.

Install the corrugated flashing pieces over the door and along the joint between the hut siding and the doorway roofing. Cut and bend the hut siding, corrugated sheet in order to give the proper slope to the doorway roof. See Fig. 1.

Install the corrugated roof sheets using salvaged sheets.

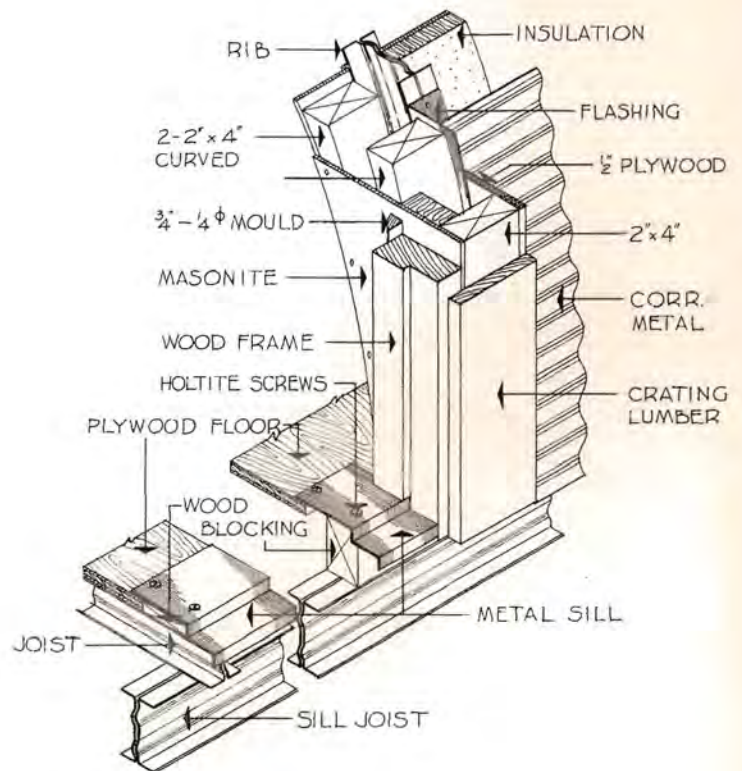


FIG. 2

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Suggestions to Erector—See Back Cover.

THE STRAN-STEEL NAILING GROOVE

The distinctive feature of Stran-Steel is the nailing groove—an exclusive Stran-Steel patent. This groove is in all Stran-Steel joists, arch ribs and studs, which are made by welding two pieces of steel together. In the case of the stud, for example, two channel sections are welded back-to-back, as shown in the accompanying illustration. The small space remaining between these pieces is just large enough to admit an ordinary nail. When a nail is driven into the groove, it is deformed and clinched in a grip of steel with a holding power much greater than that of wood. In this manner collateral materials are secured to the steel framework with the ordinary hammer-and-nails method.

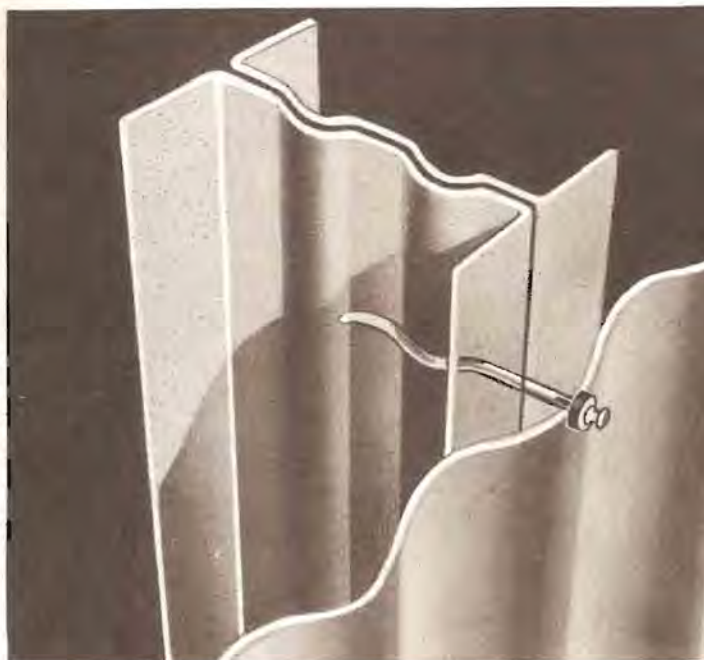
Construction in which Stran-Steel framing is used proceeds in the same way as with ordinary framing. Dimensions of Stran-Steel members conform exactly to the requirements of the collateral materials used with it.



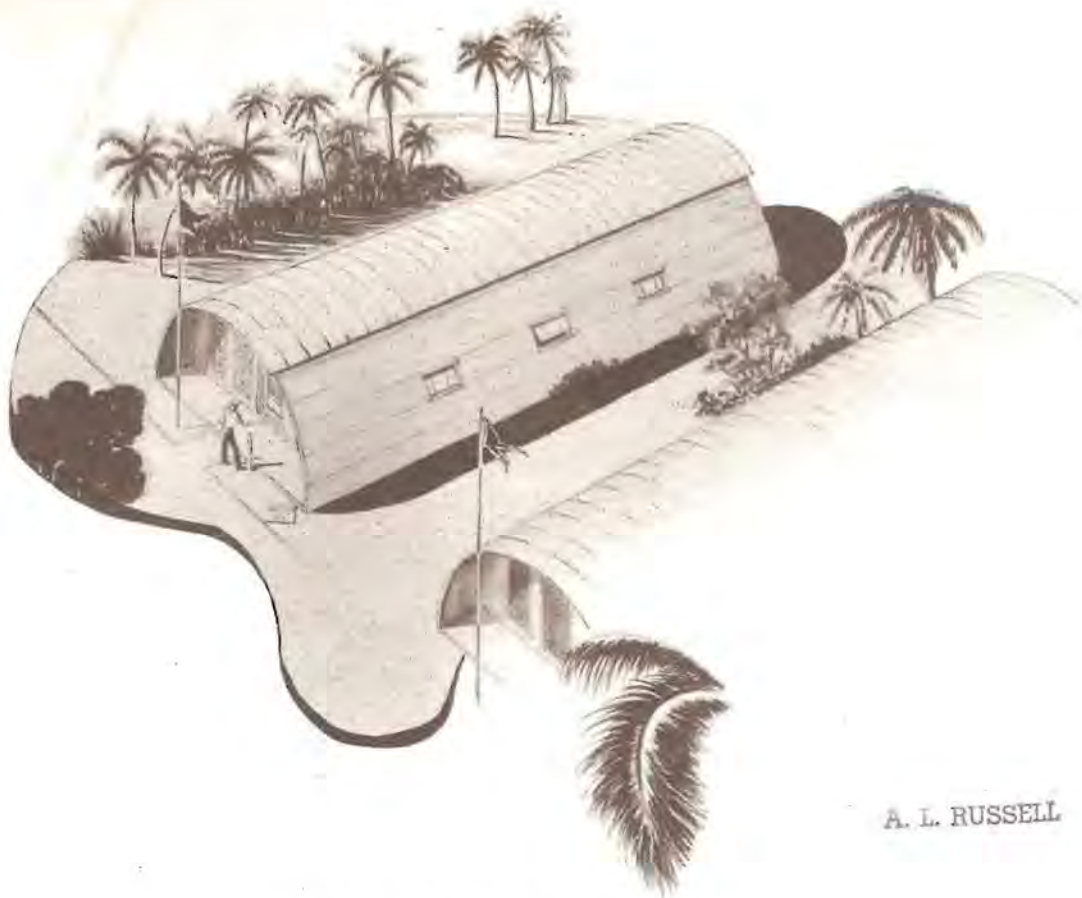
Typical nailing



Nail clip at window



Phantom view showing nail in nailing groove



A. L. RUSSELL

SUGGESTIONS TO ERECTOR

Crews. The erection of the Arch Rib Hut is simple and fast. One operation quickly follows another—if the first one is done properly. What is most important is getting off to the right start in having the floor joist assembly level and square and having the rib assembly plumb. This insures that subsequent operations will proceed without difficulty. Therefore, your best mechanics should be assigned to setting the frame even though the actual assembly of this portion of the work is the easiest of all. Likewise the roofing operation requires the care of a mechanic or mechanically-minded person. A sensible division of personnel is into separate crews for (1) leveling the site, (2) setting the frame, (3) applying flooring, inside covering and insulation, (4) applying ventilators and roofing, (5) setting bulkheads, and (6) installing electrical system.

Hints. If any of the steel members have become damaged in shipment, the easiest way to straighten them is by placing the bent part over a crate or sawhorse and having a man bear down on each end. The hardest way to straighten is by using a hammer. There is a trick to opening the banded crates. When this is known and used, much time and effort can be saved. Take one of the screwdrivers furnished for assembling the frame, insert flat side under steel band about an inch or inch-and-half. Turn the screwdriver about the handle roughly an eighth turn. This brings the sharp edge of the screwdriver in contact with the band. Pull up quickly. This motion cuts the band rather than breaking it. The latter operation requires a heavy bar and much strength. When the knack of using a screwdriver is learned, opening the crates is an easy job.

The importance of using the right nails, screws, and attachments cannot be too strongly stressed. Follow the instructions closely in this regard because if the wrong ones are used, it will mean borrowing from another Hut all down the line with consequent loss of time.

Tools. A complete set of necessary tools is furnished for erecting the complete Hut. There is one set for every four Huts. They should be supplied to the men who will use them. If there are many Huts to be erected at one location, the best scheme is to open all the boxes containing tools and pool them. Then issue by tool check.

Take good care of the tools.

U. S. NAVY STEEL ARCH RIB HUT