US 20080034681A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2008/0034681 A1

McDonald (43) Pub. Date: Feb. 14, 2008

(54) **FIRST HOUSE II**

(75) Inventor: **Paul Francis McDonald**, Berlin (DE)

Correspondence Address:
Paul Francis McDonald
Propst-Sussmilch Weg 10
Berlin 14169

(73) Assignee: **Paul Francis McDonald**, Berlin (DE)

(21) Appl. No.: **11/503,088**

(22) Filed: **Aug. 14, 2006**

Publication Classification

(51) **Int. Cl.**
E04B 7/04 (2006.01)

(52) **U.S. Cl.** **52/93.1**

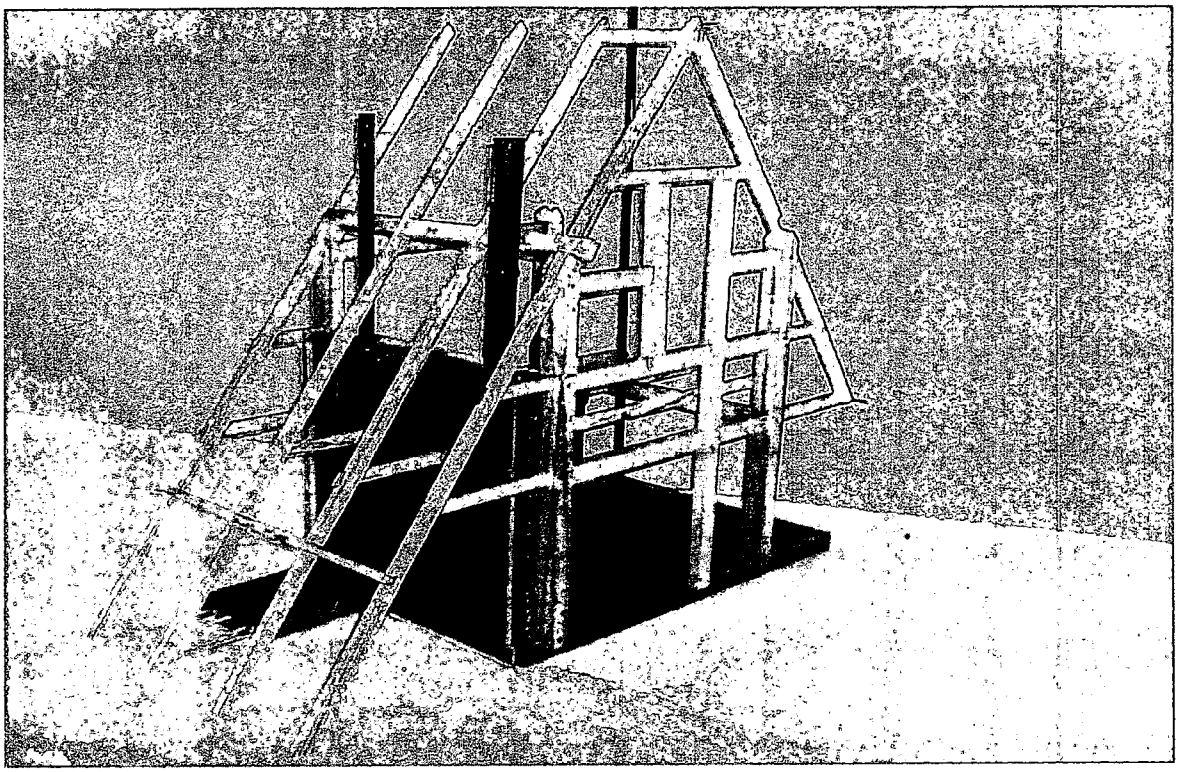
(57) **ABSTRACT**

First House II is a self regulating, solar powered, air cycle machine. Thermo radiation and photovoltaic conversion interact proportionally to moderate [climatic] extremes. It incorporates the natural cycles for water, waste, garbage, household dirt and for air purification.

The interior cantilever post and beam skeleton, with innovative joinery, is sheathed in rigid non-biodegradable skin to form a permanent, low maintenance structure.

The interior and exterior geometry for radiant energy absorption also utilizes skin openings, temperature and pressure differentials to control air quality and flow. [Openings for doors], windows and holes are precision cut from the skin and [then] reinstalled to prevent unintentional convection, conduction or radiant energy loss.

Pre-manufactured interchangeable parts permit phased construction or expansion with no onsite waste or refuse. Structural materials are multifunctional and provide capabilities for energy independence with no need for municipal services over its unlimited service life.



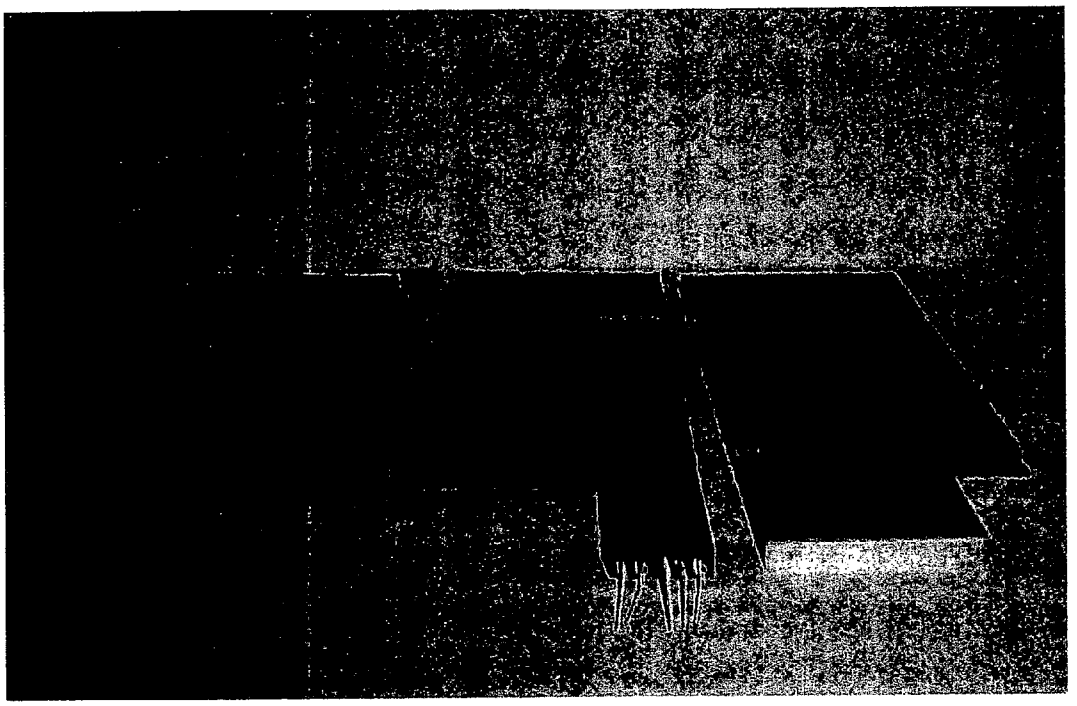


FIG 1A

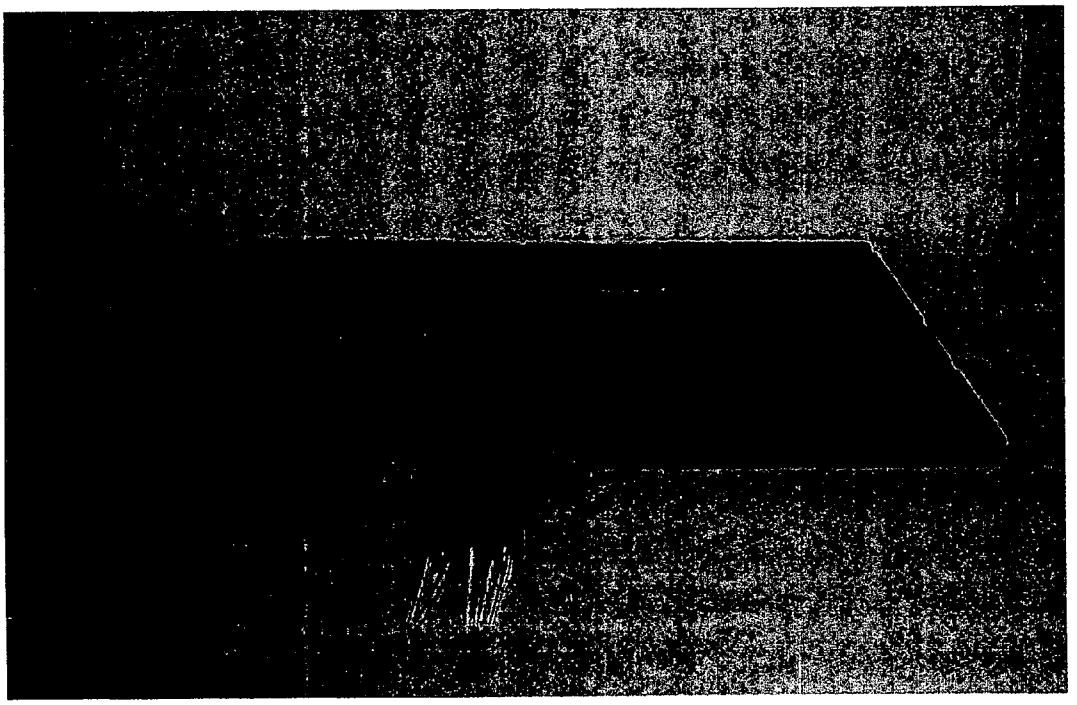


FIG 1B

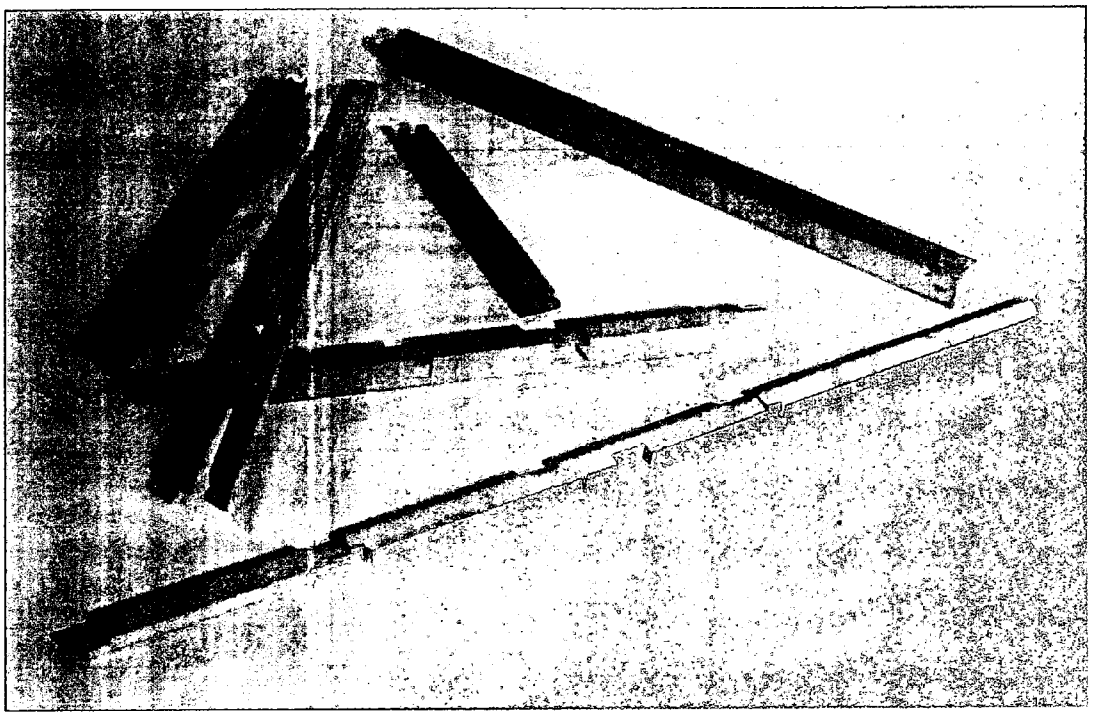


FIG 2A

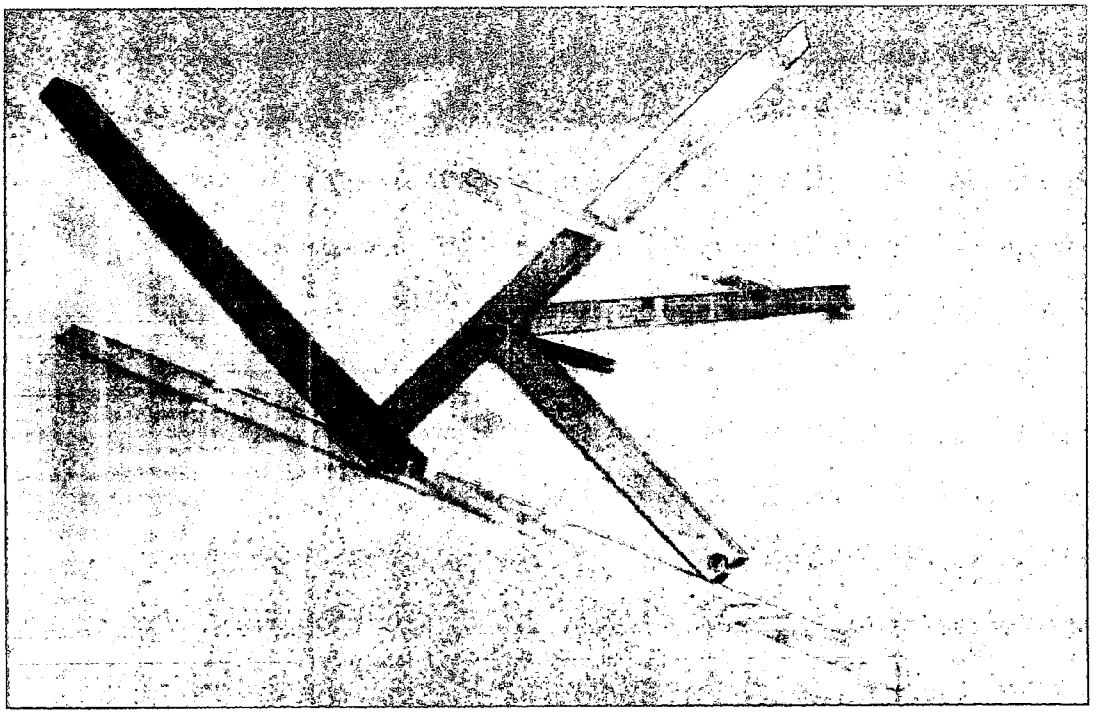


FIG 2B

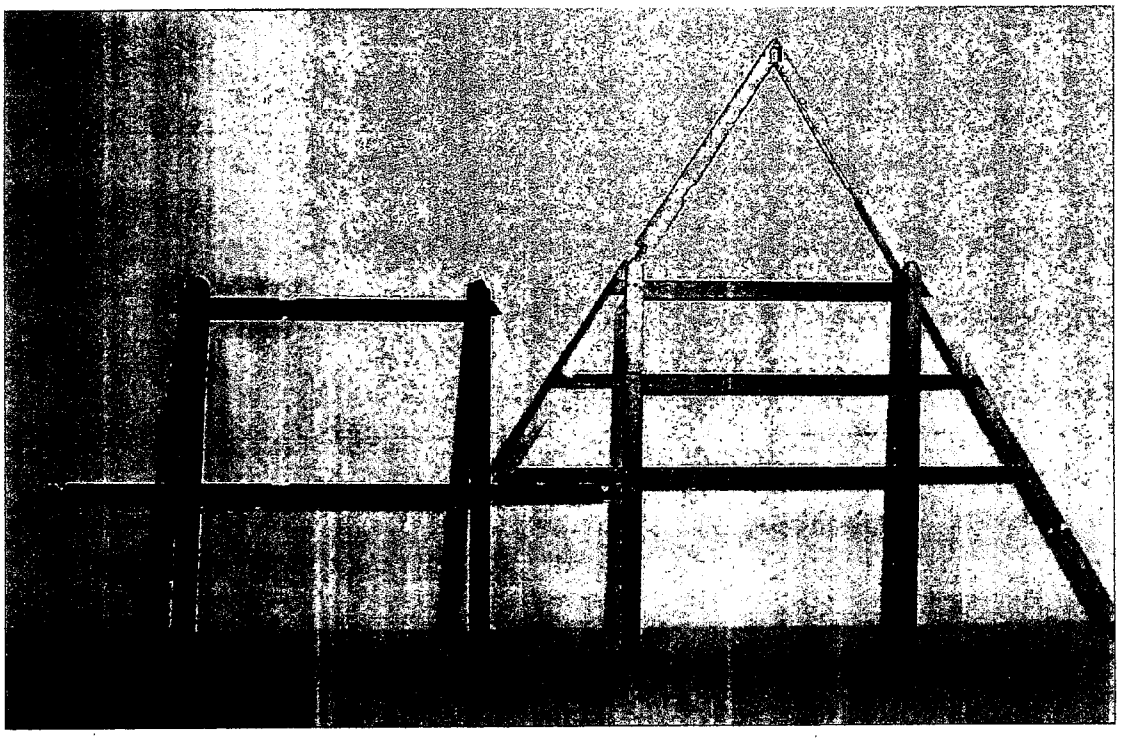


FIG 3A

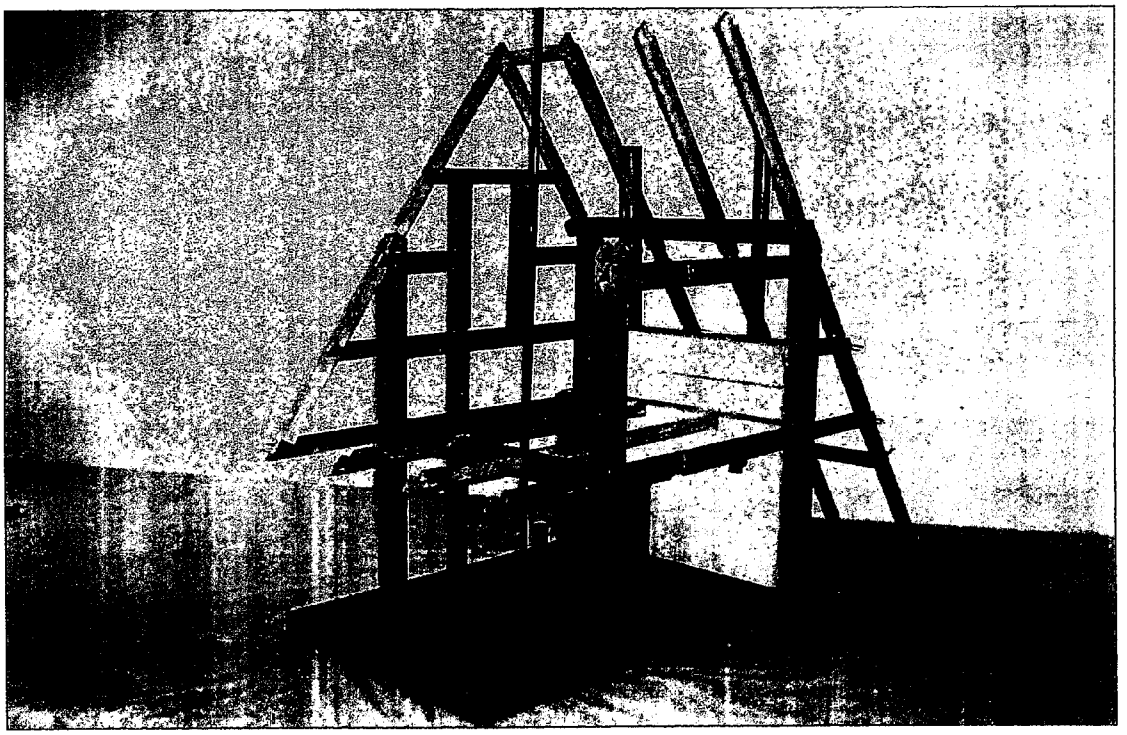


FIG 3B

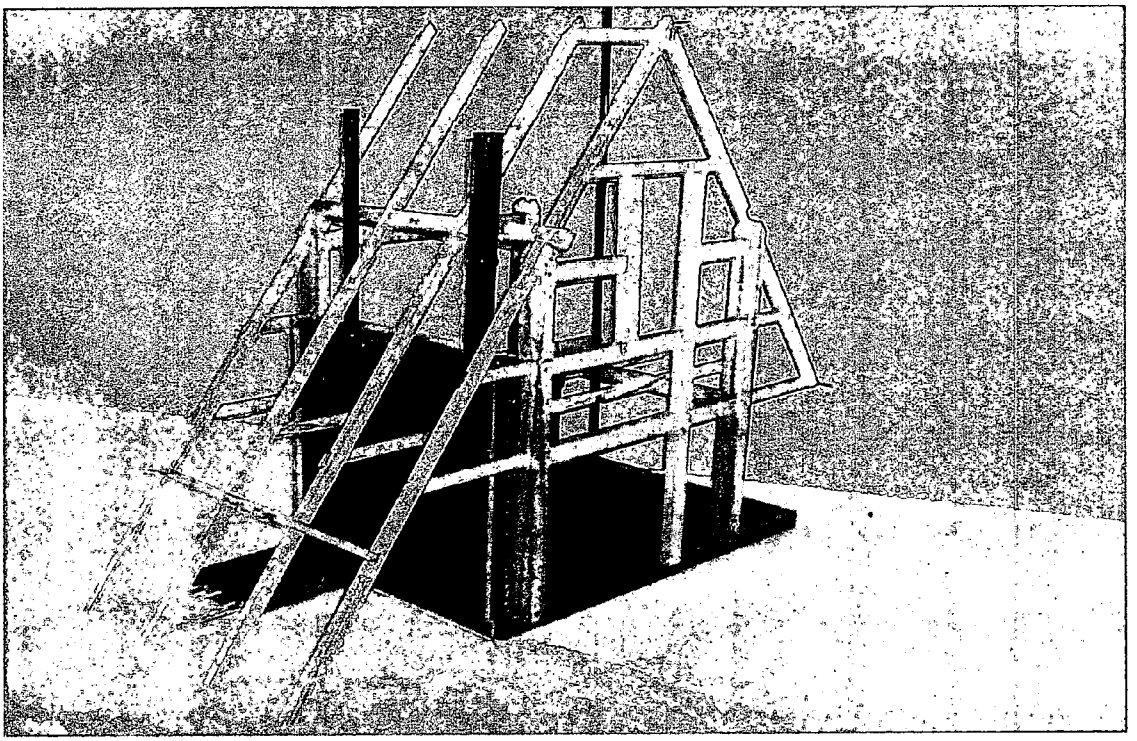


FIG 4A

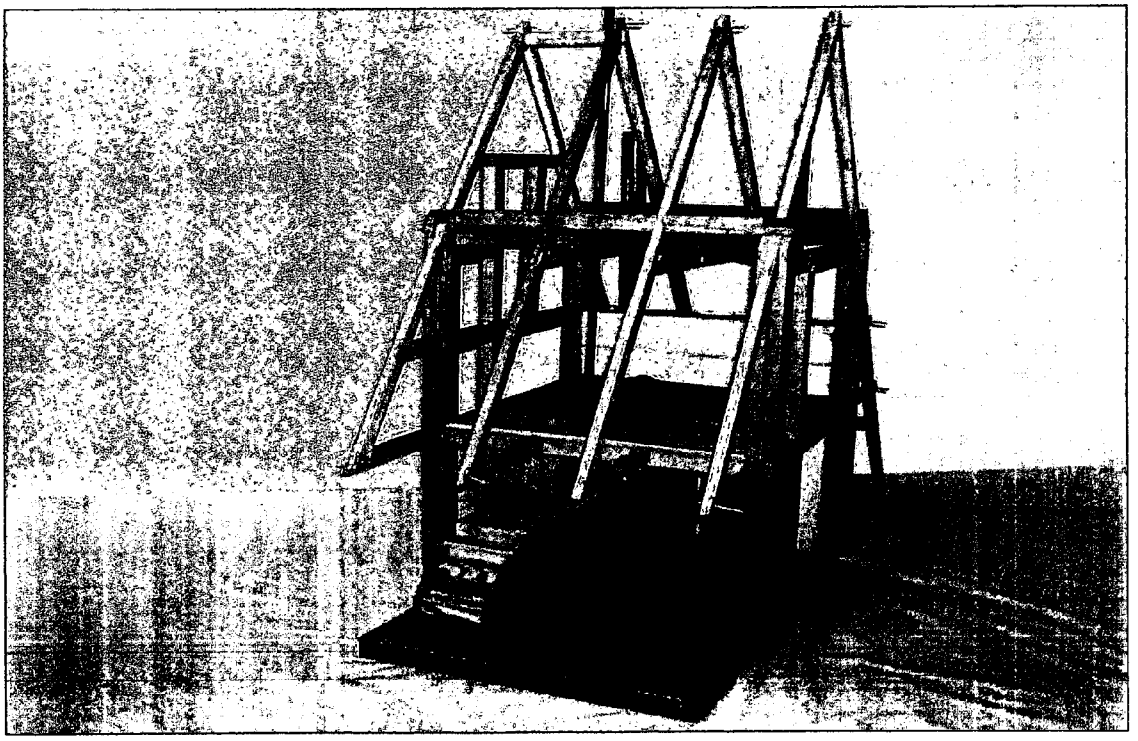


FIG 4B

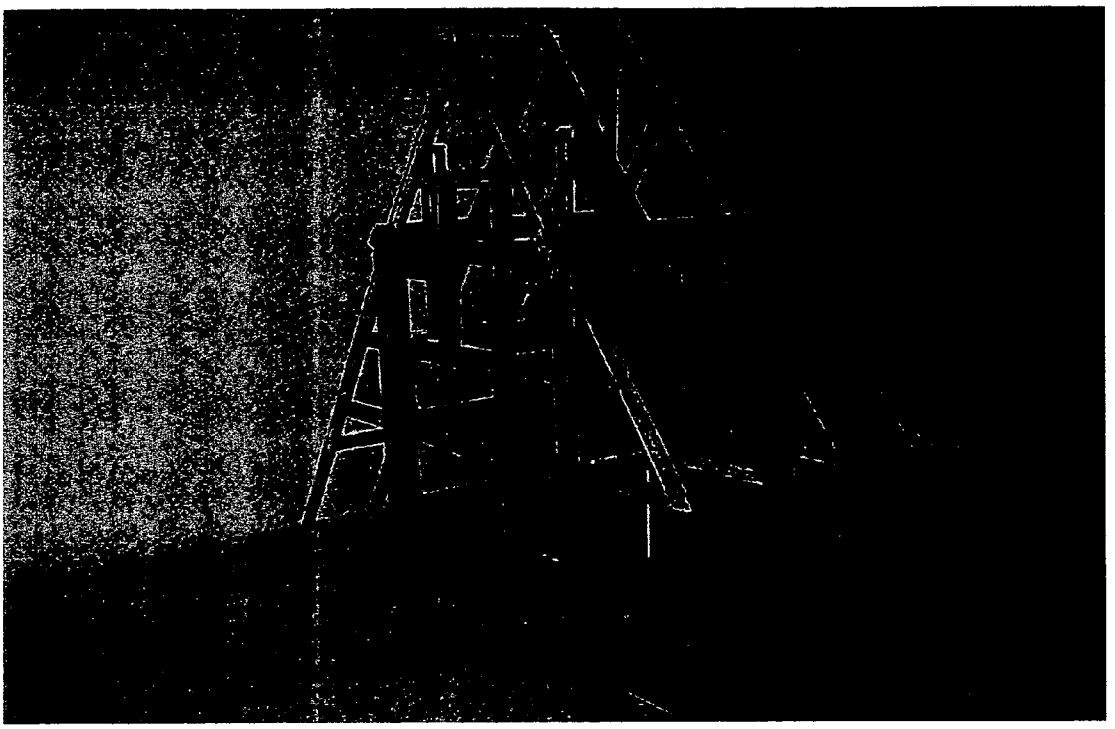


FIG 5A

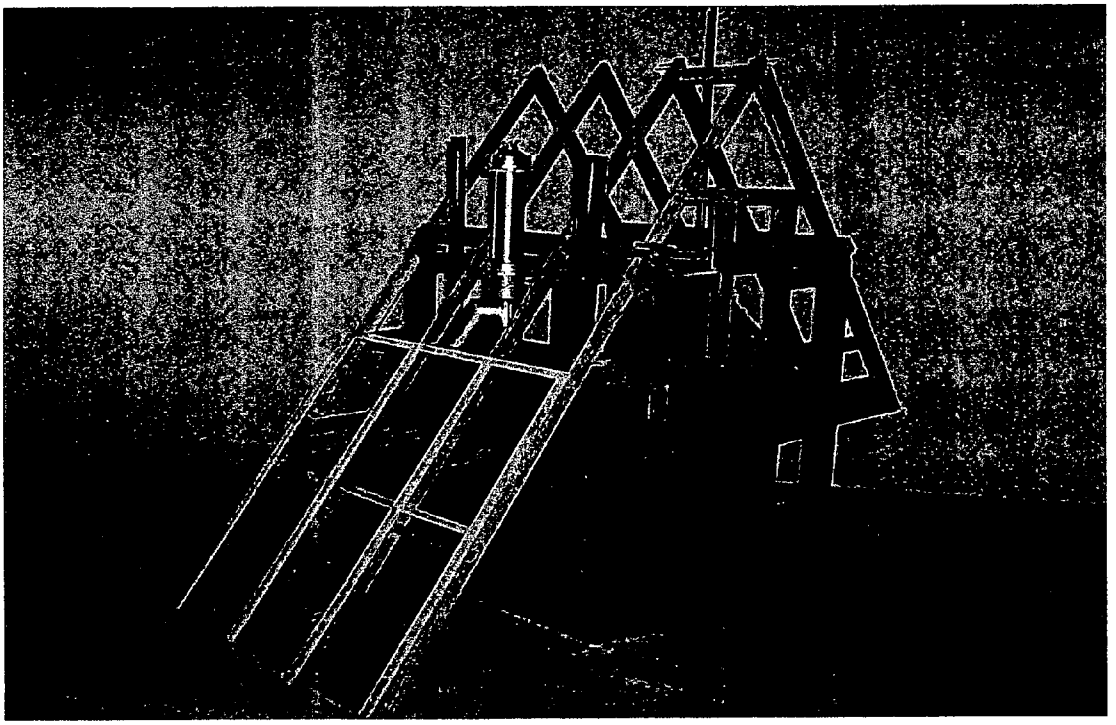


FIG 5B

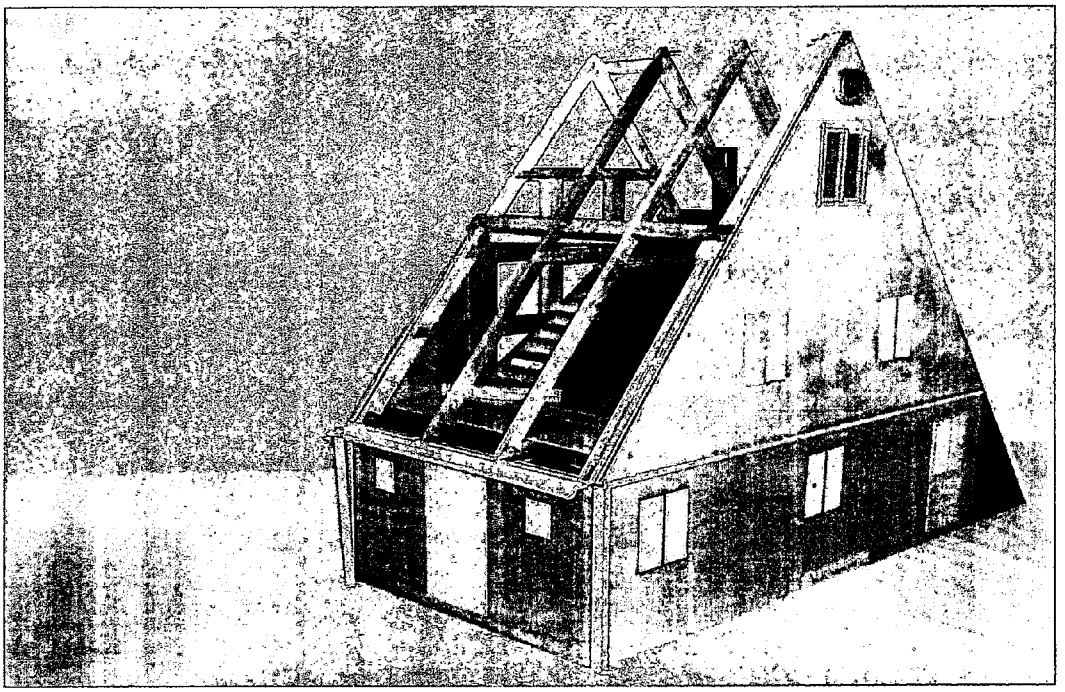


FIG 6A

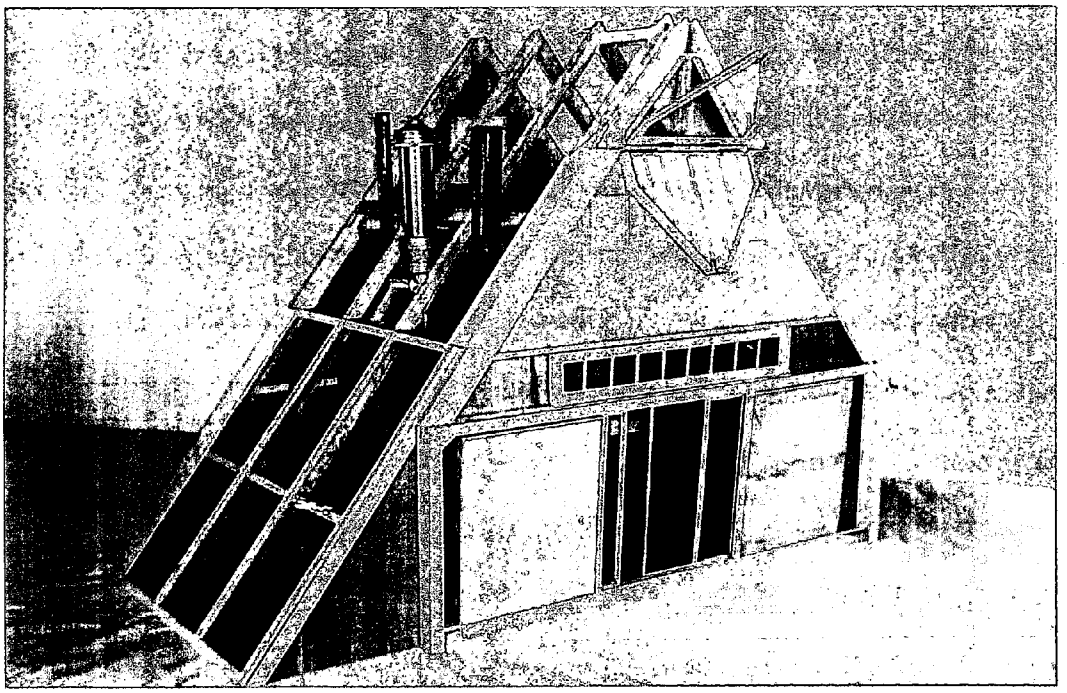


FIG 6B

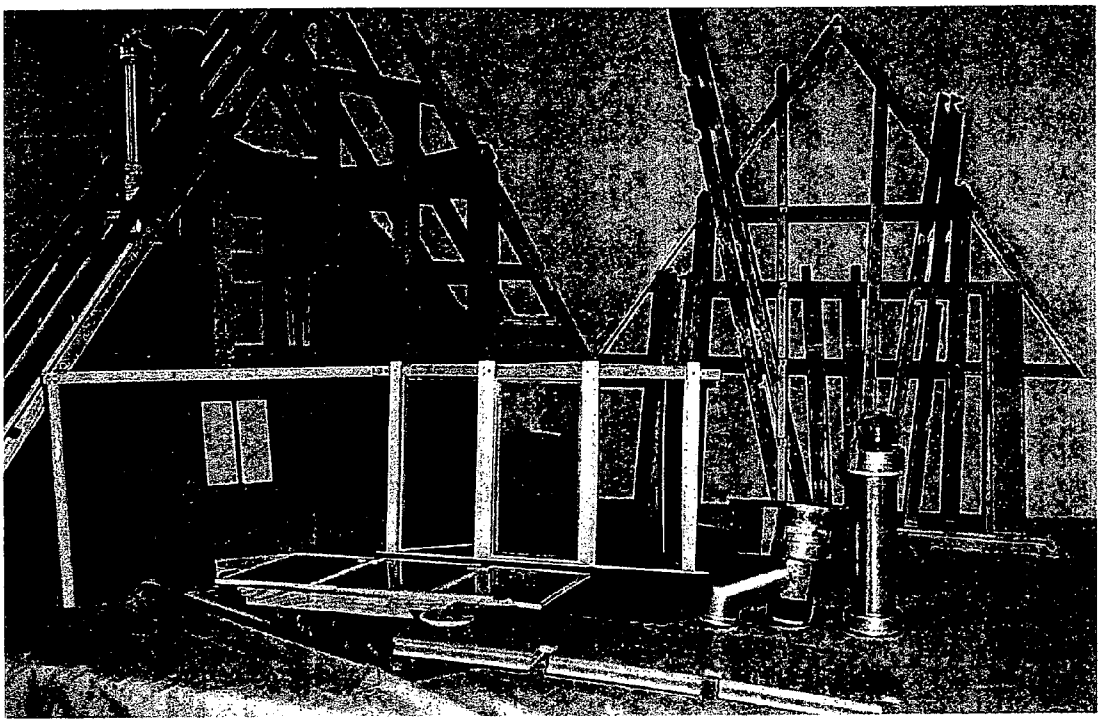


FIG 7A

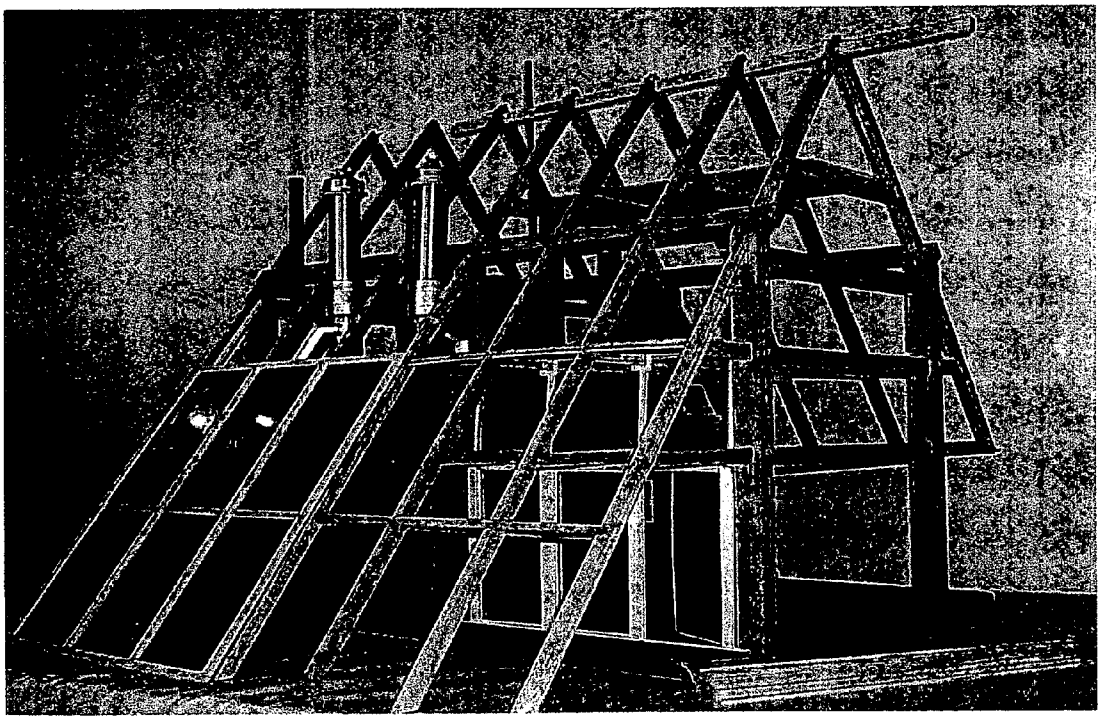


FIG 7B

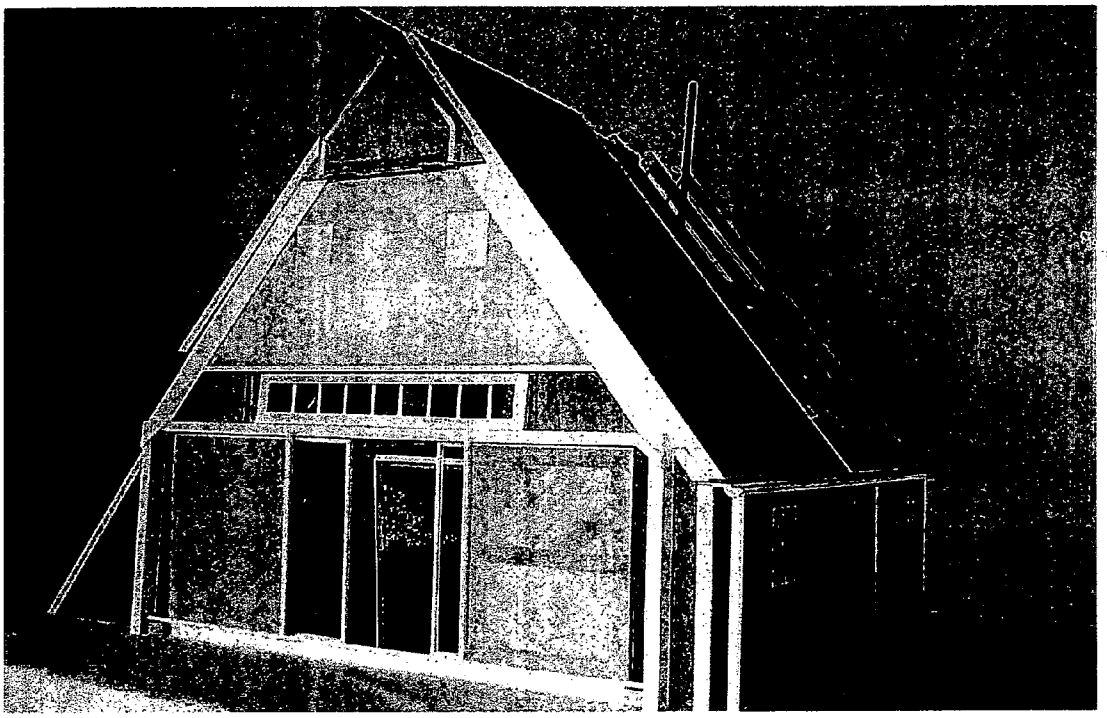


FIG 8A

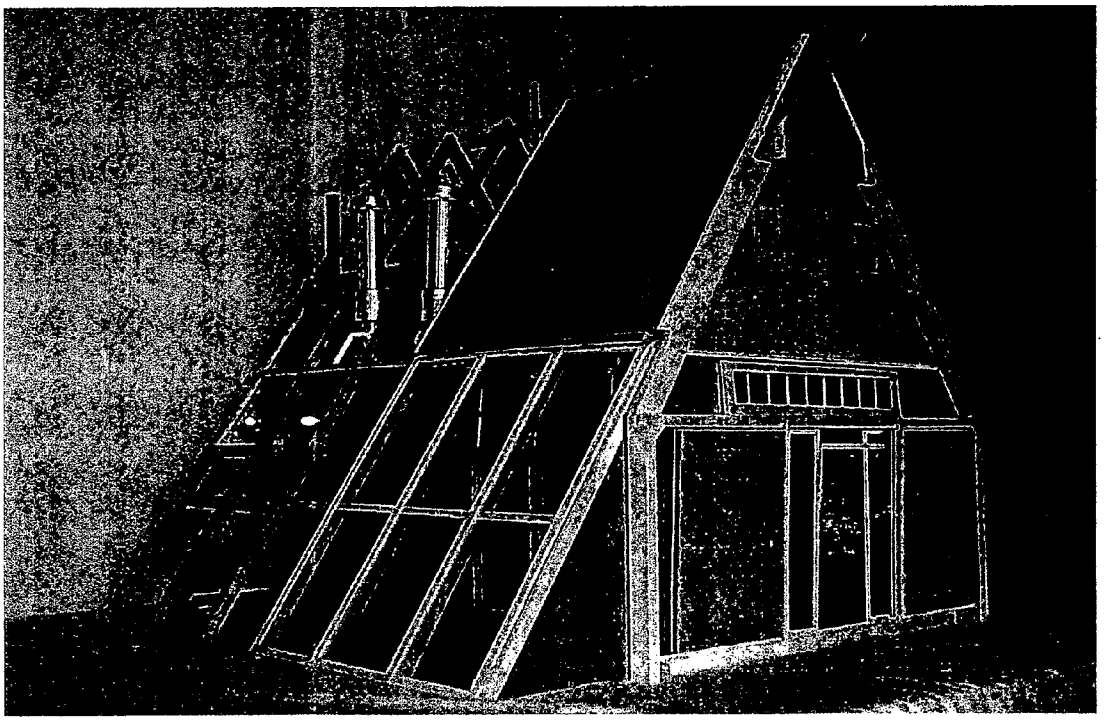


FIG 8B

FIG 9A

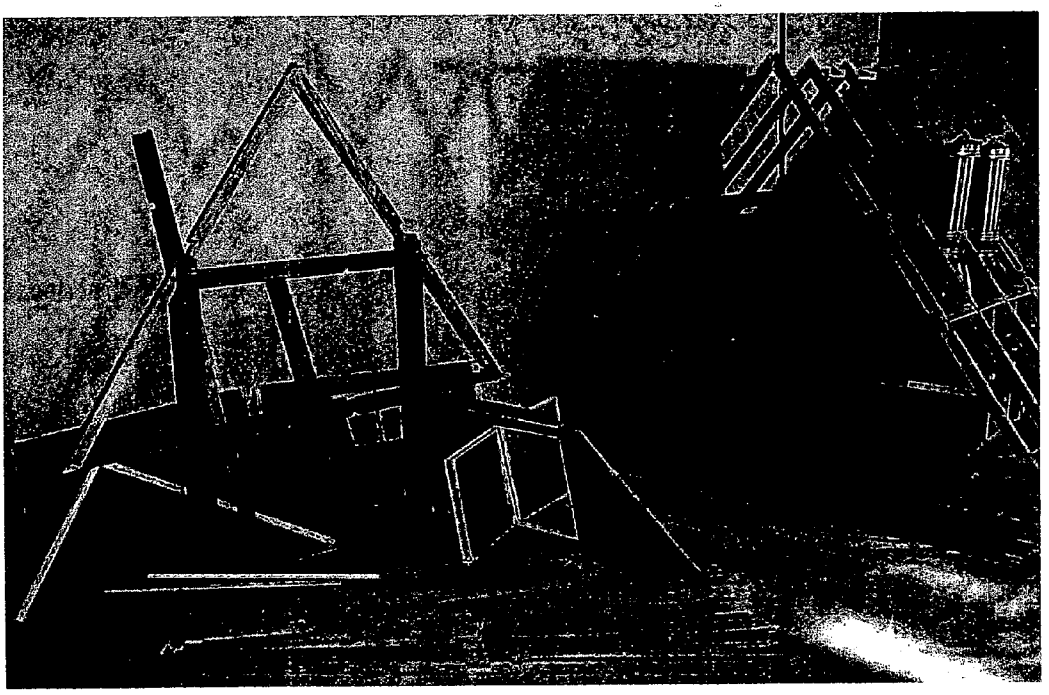


FIG 9B

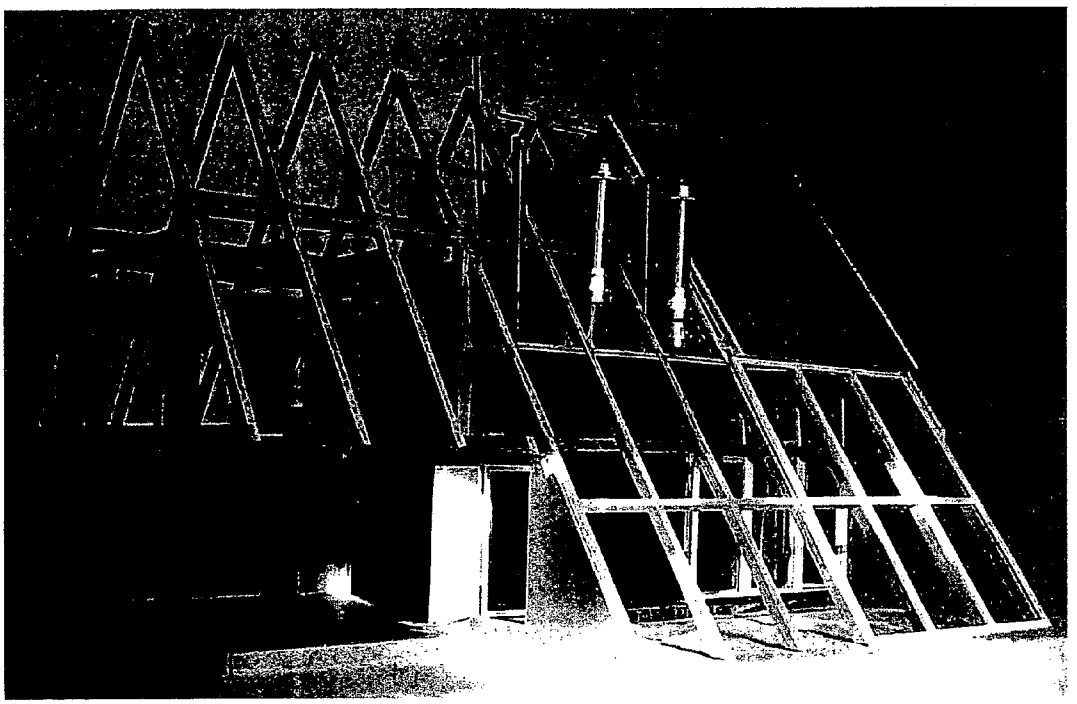


FIG 10A

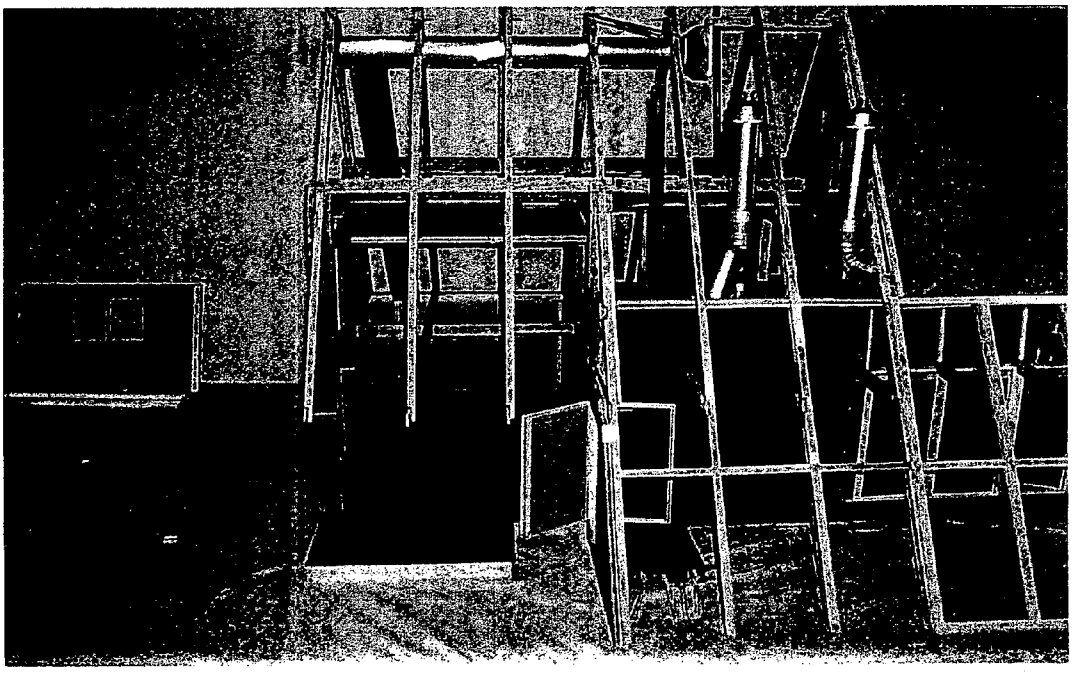


FIG 10B

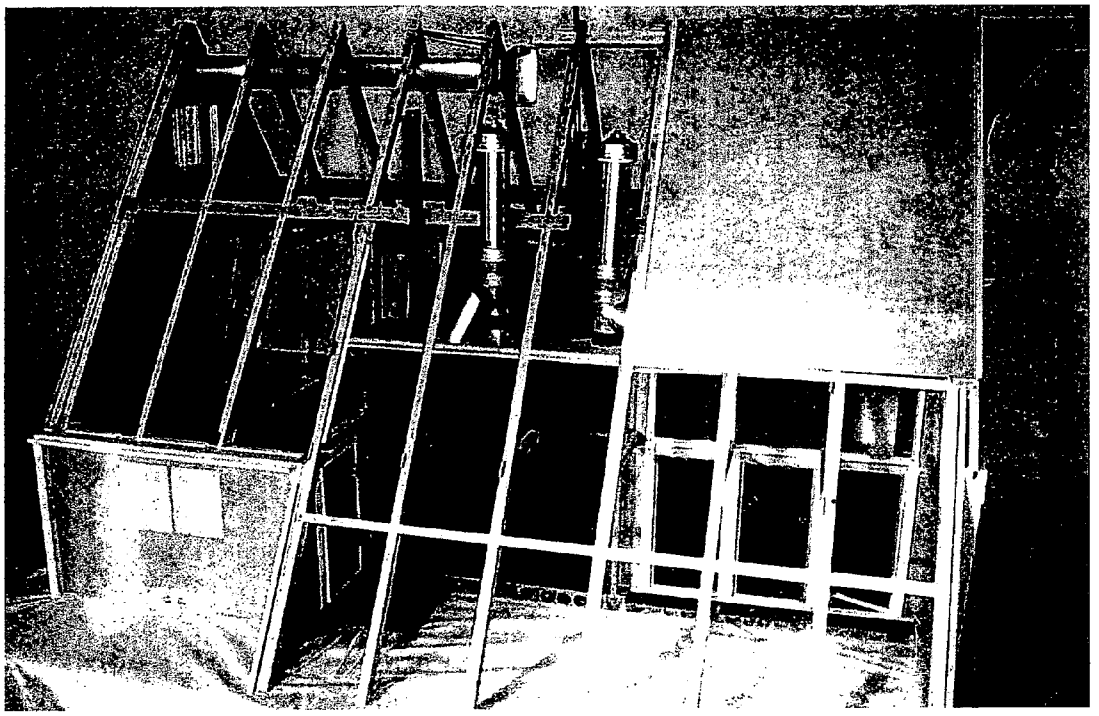


FIG 11A

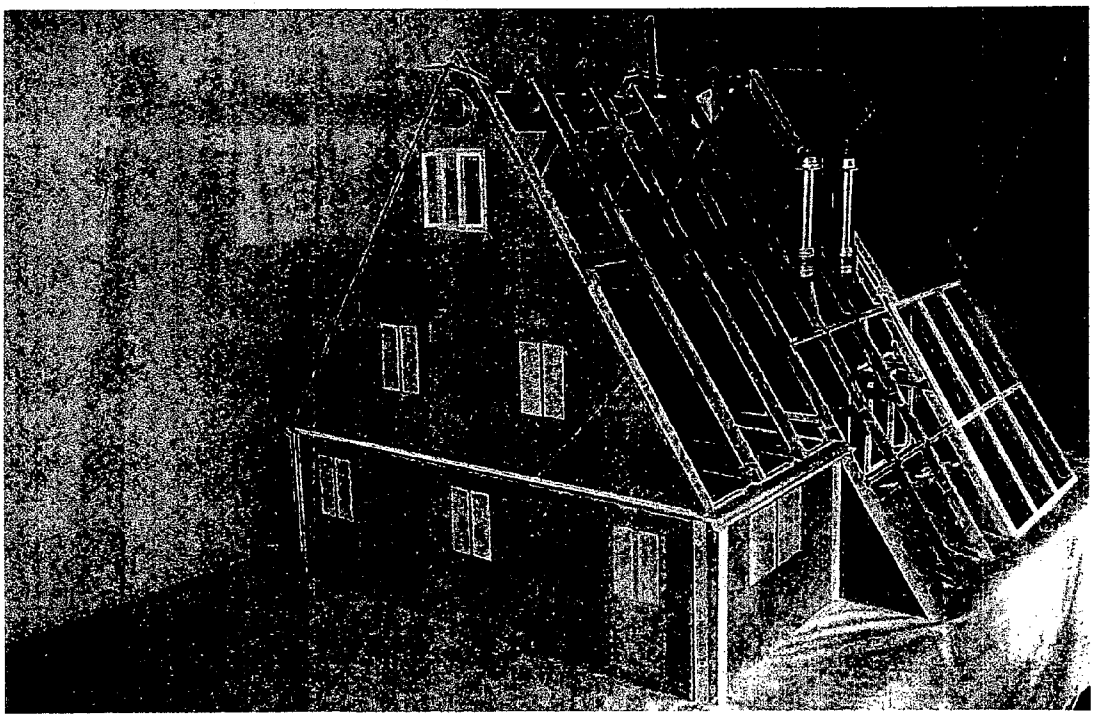


FIG 11B

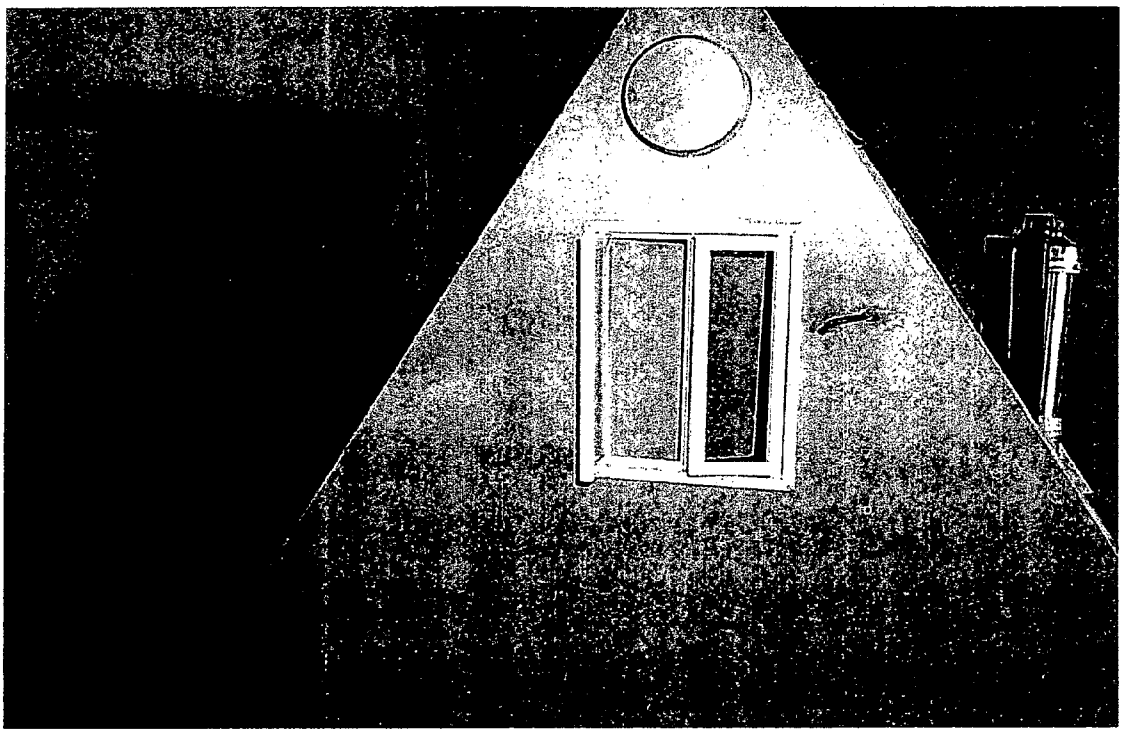
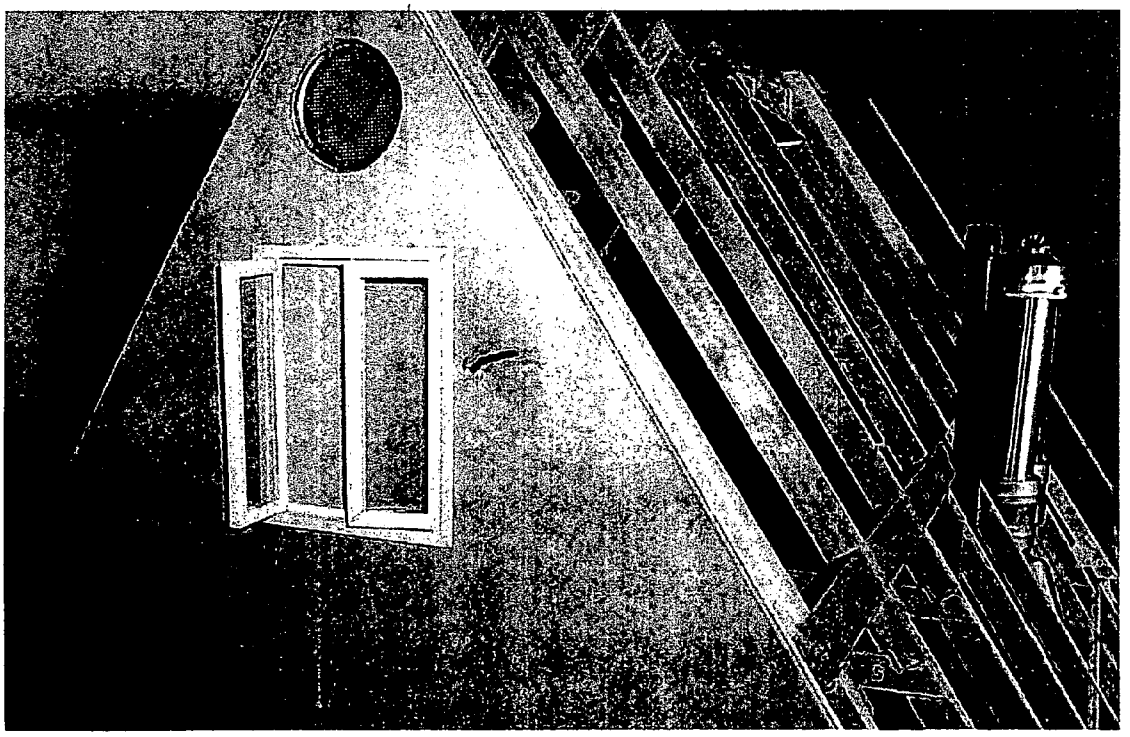


FIG 12A



FUG 12B

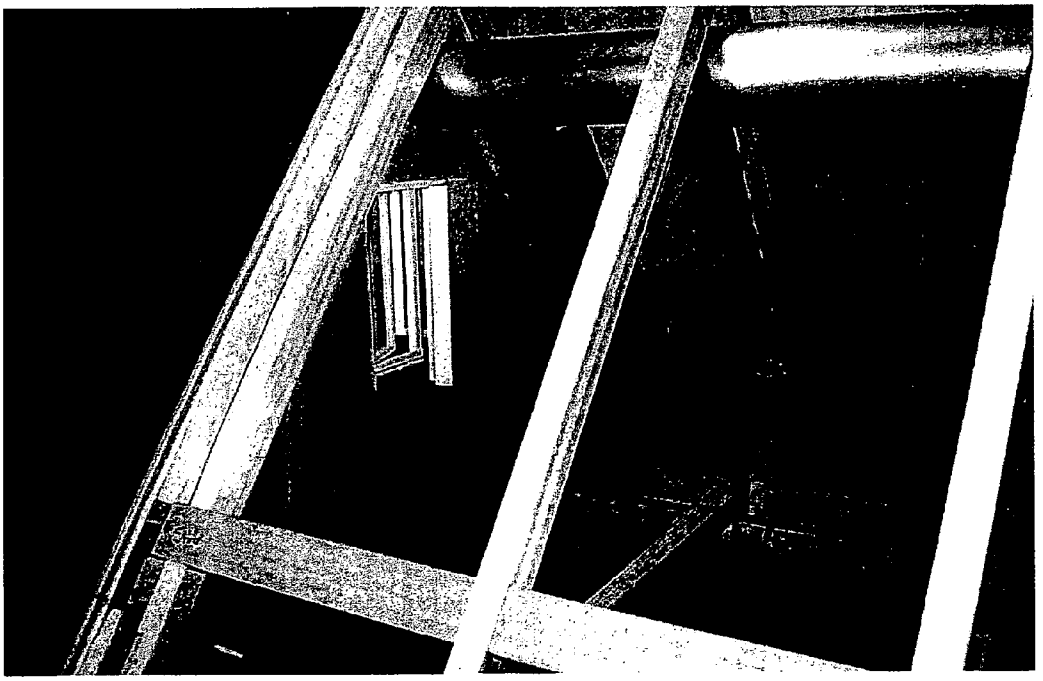


FIG 13A

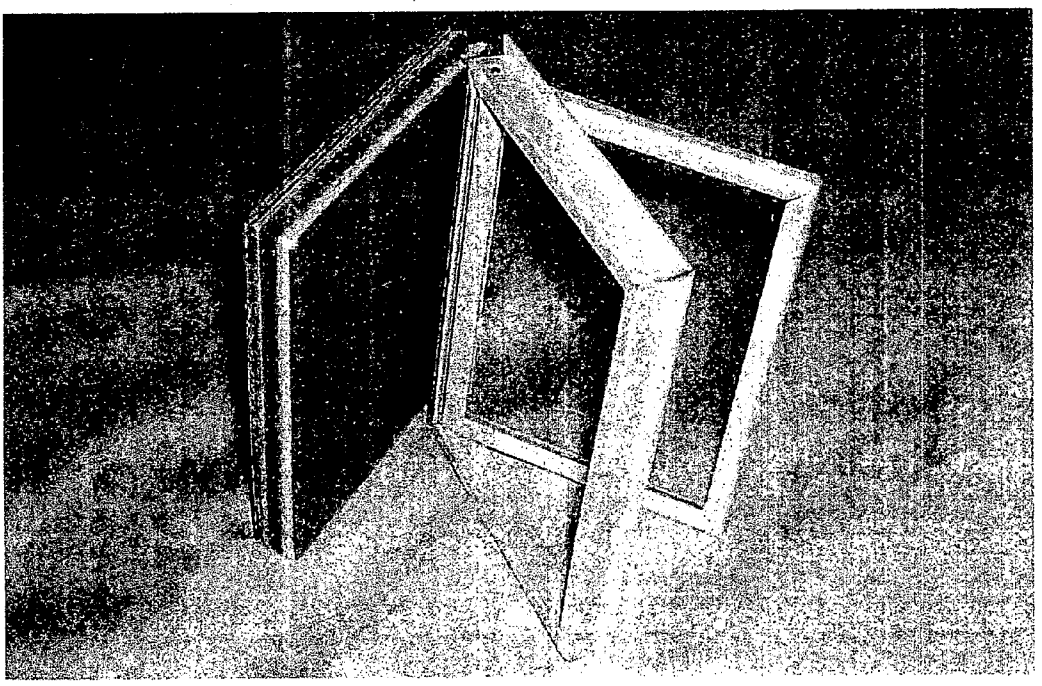


FIG 13B

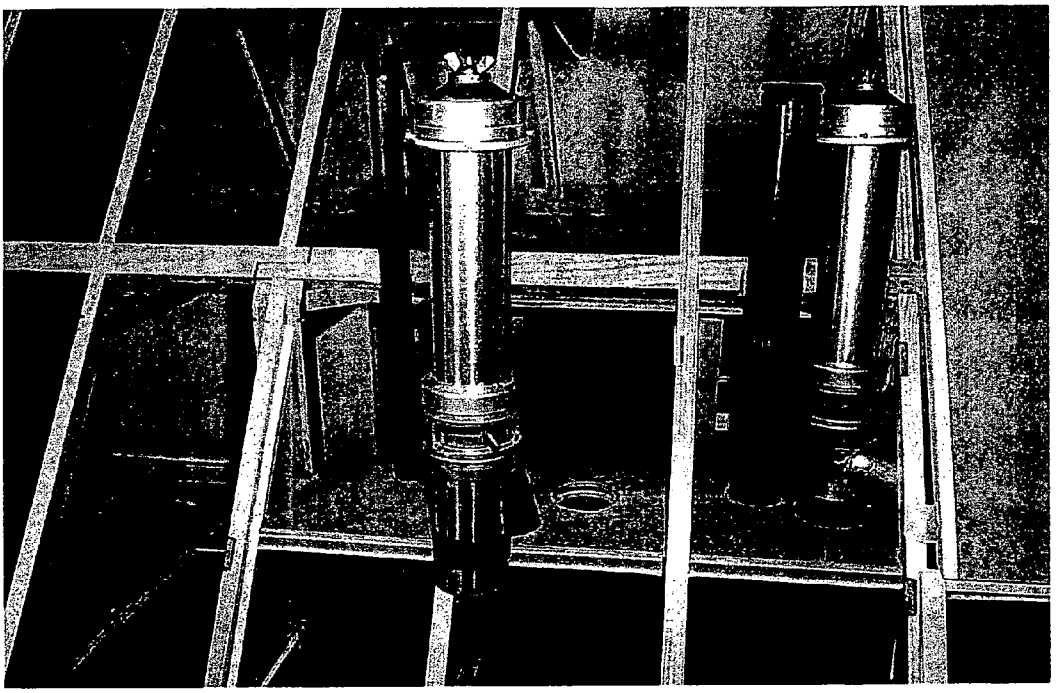


FIG 14A

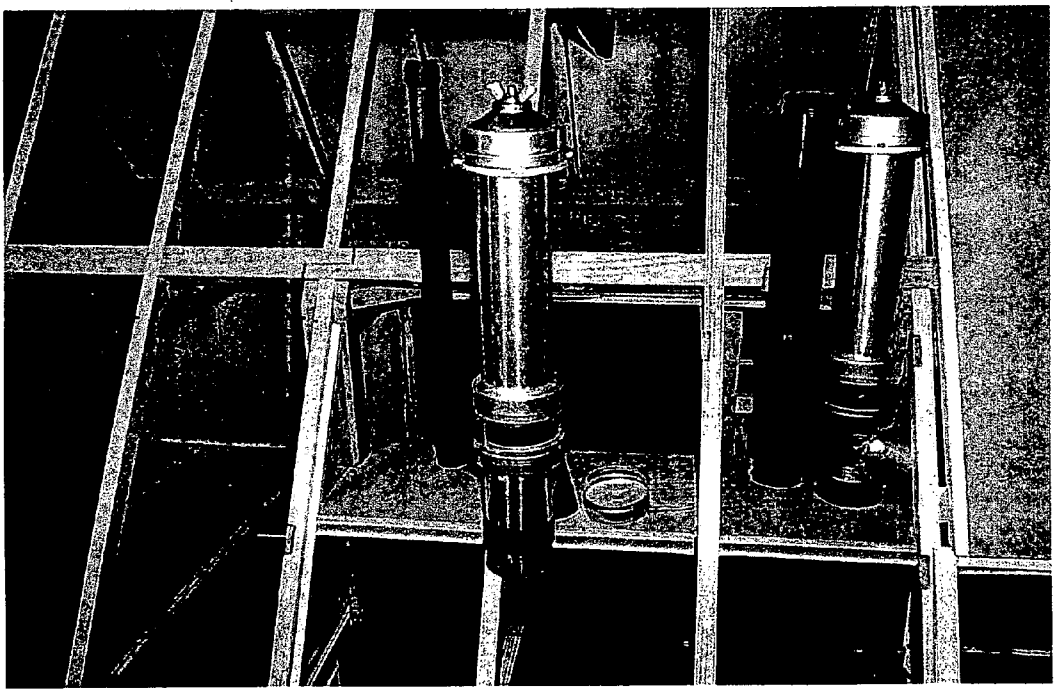


FIG 14B

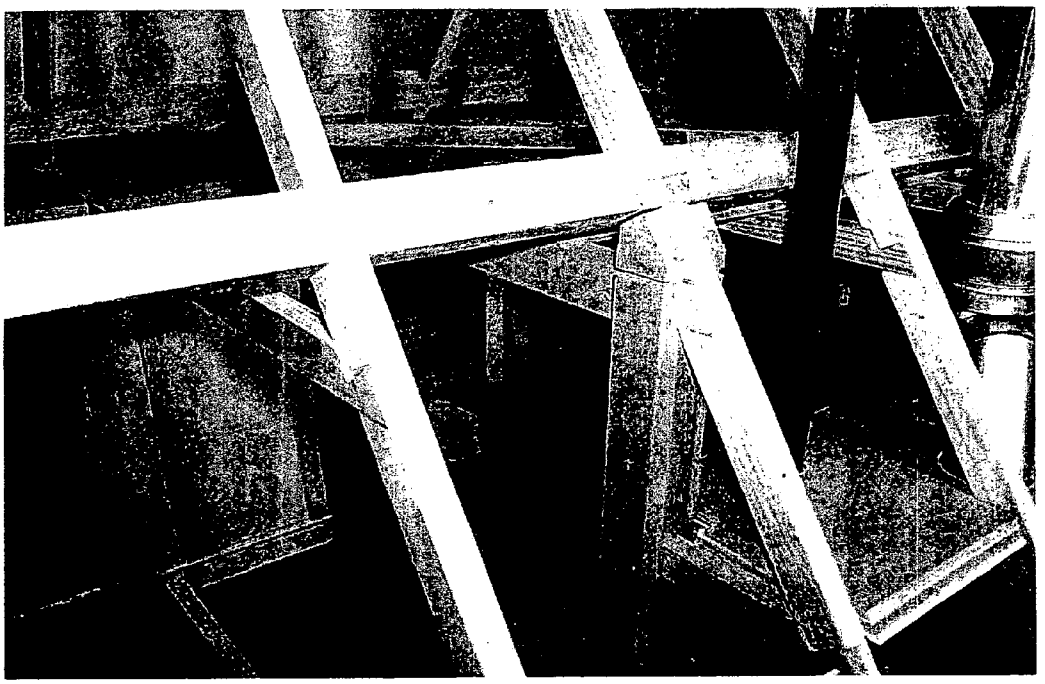


FIG 15A

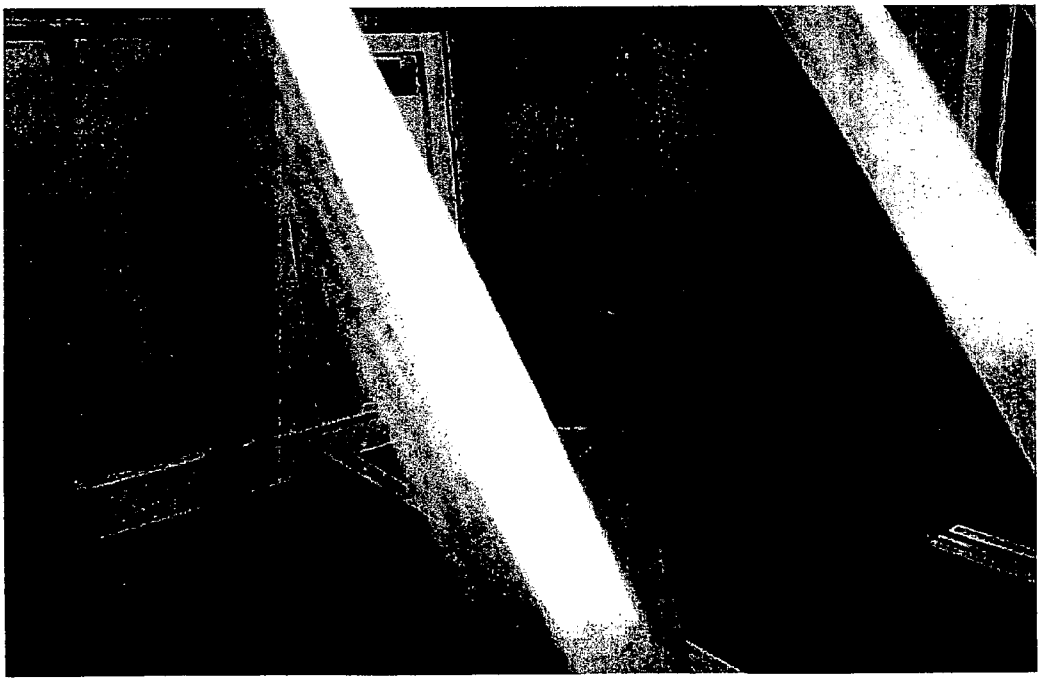


FIG 15B

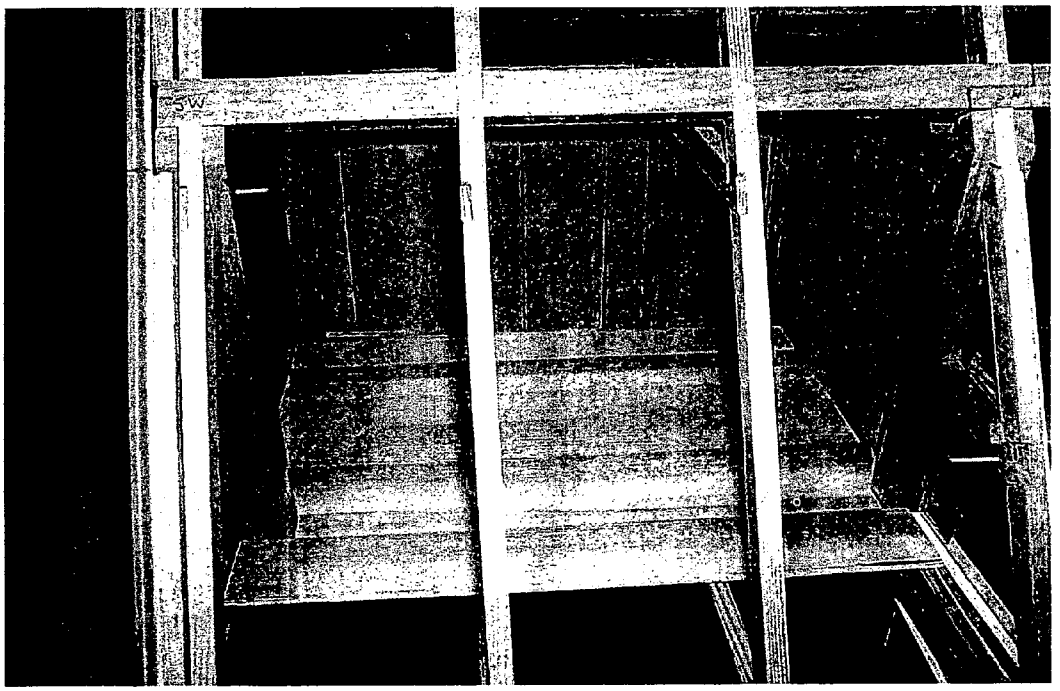


FIG 16A

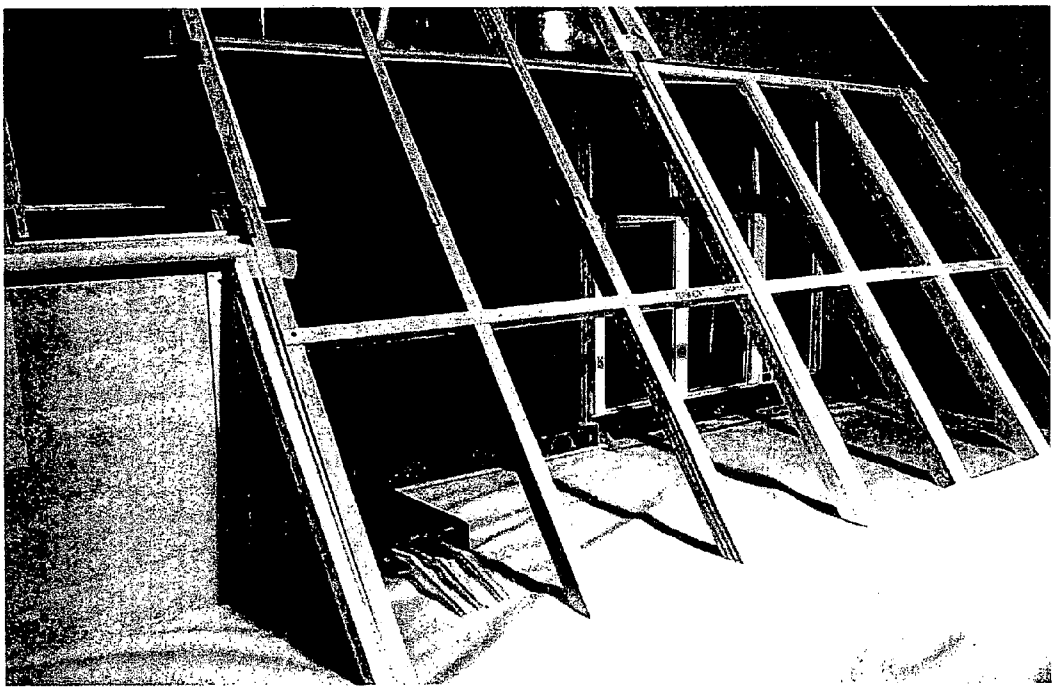


FIG 16B

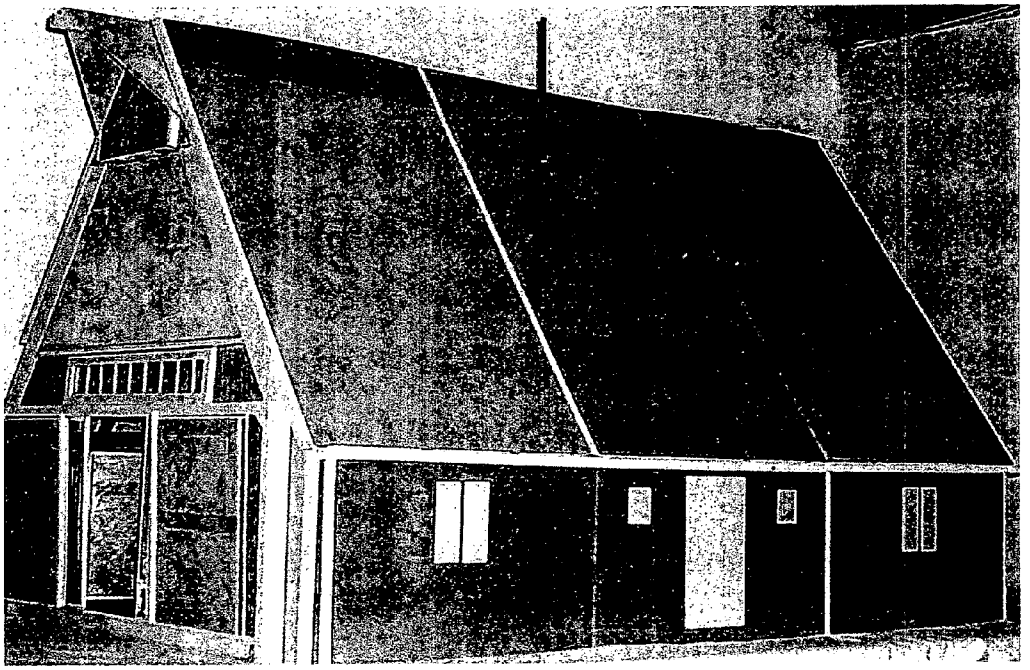


FIG 17A

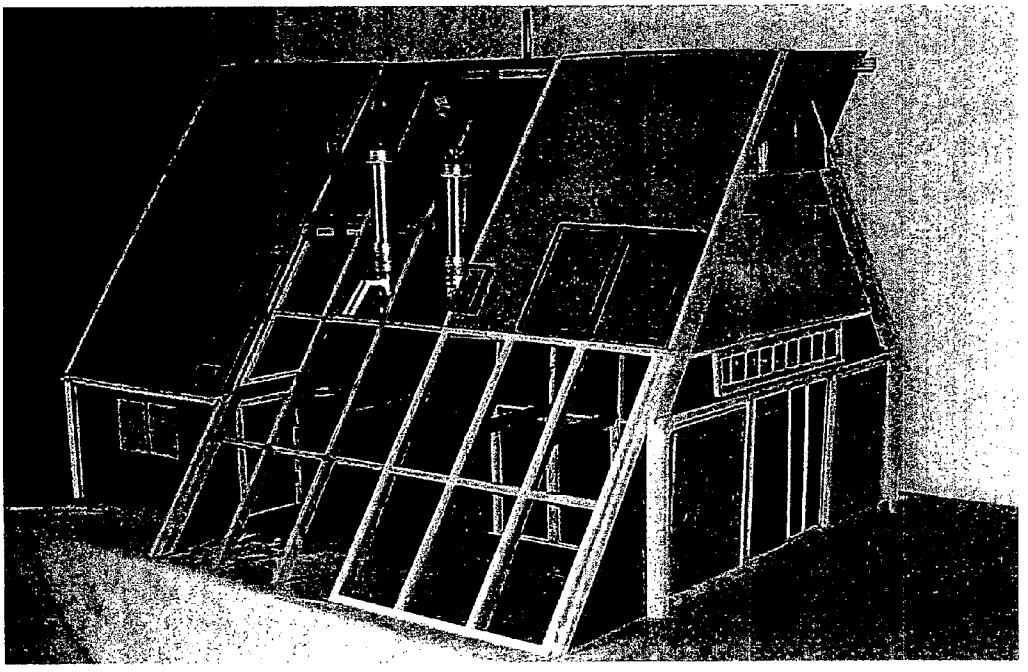


FIG 17B

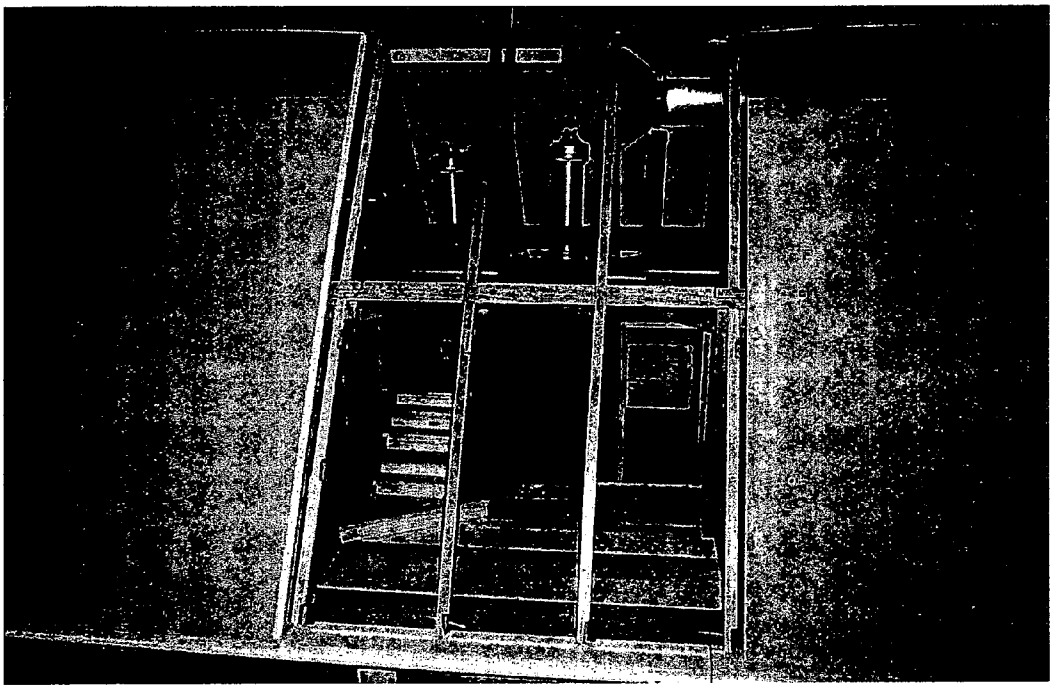


FIG 18A

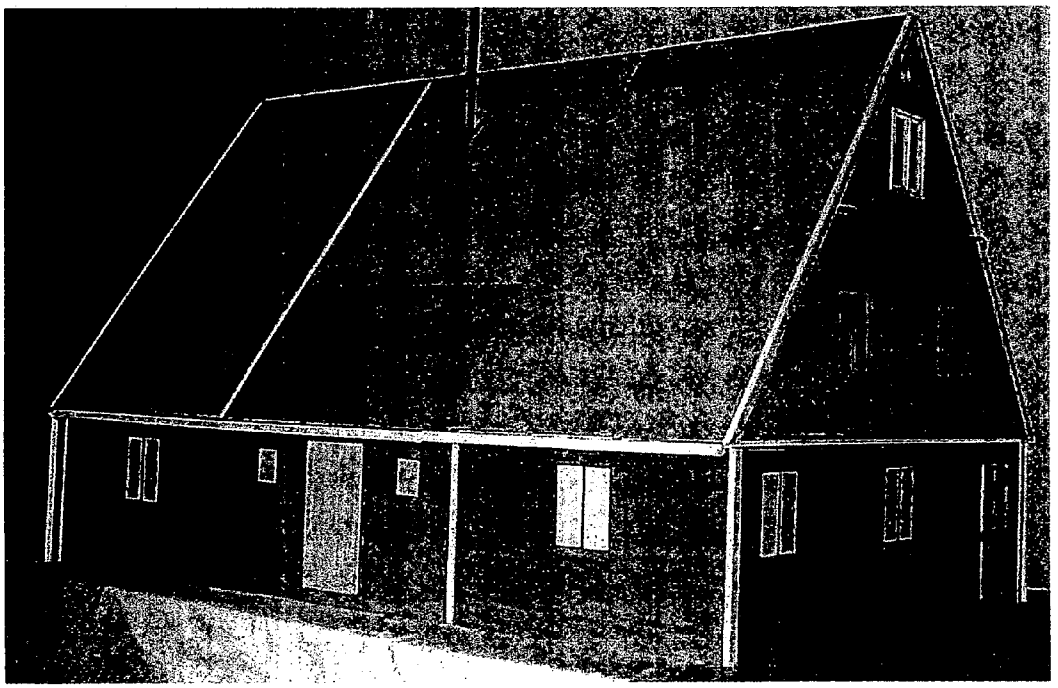


FIG 18B

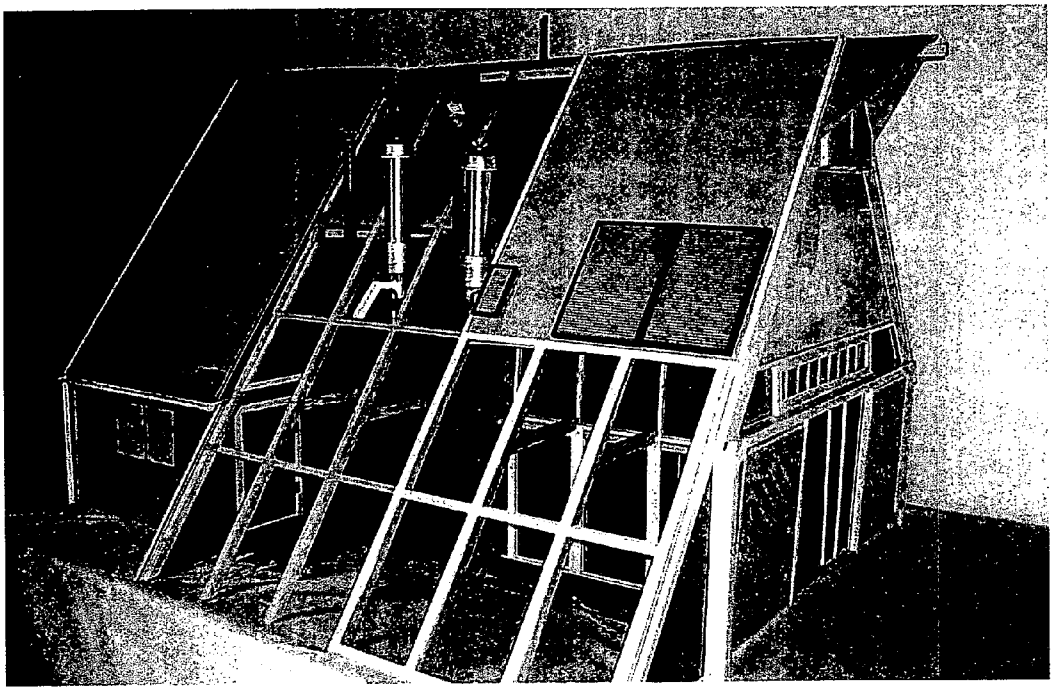


FIG 19A

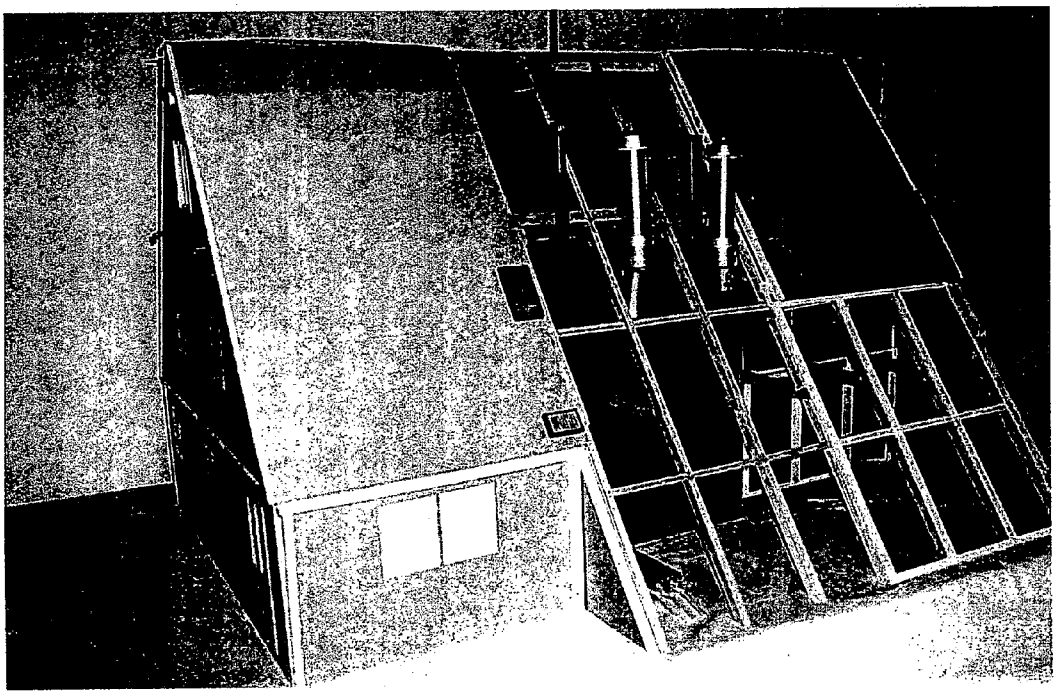


FIG 19B

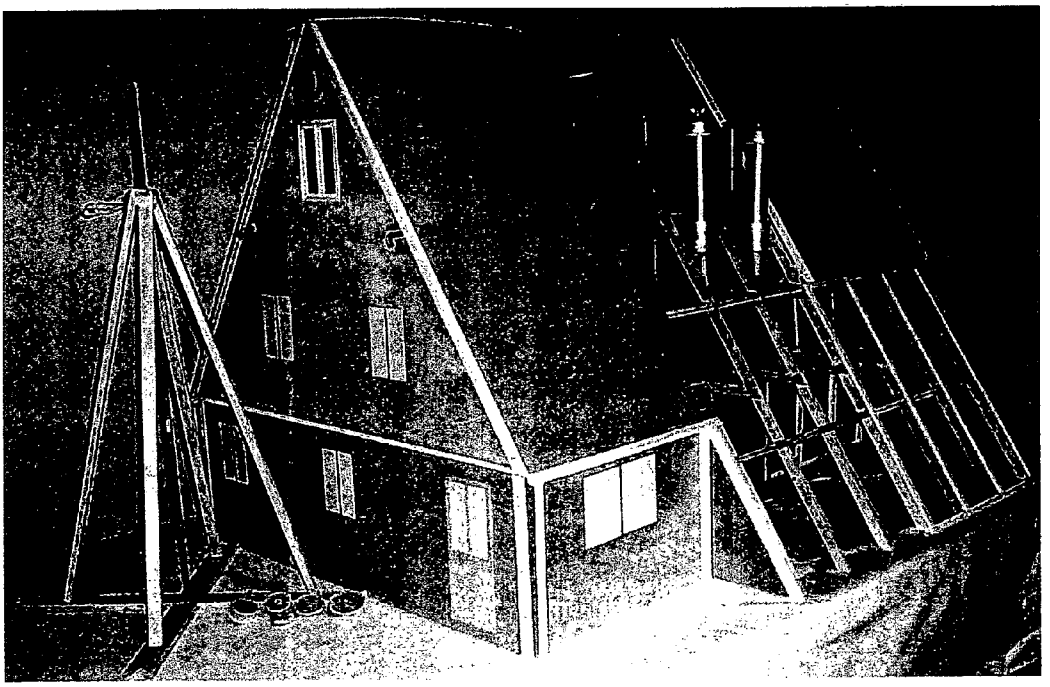


FIG 20A

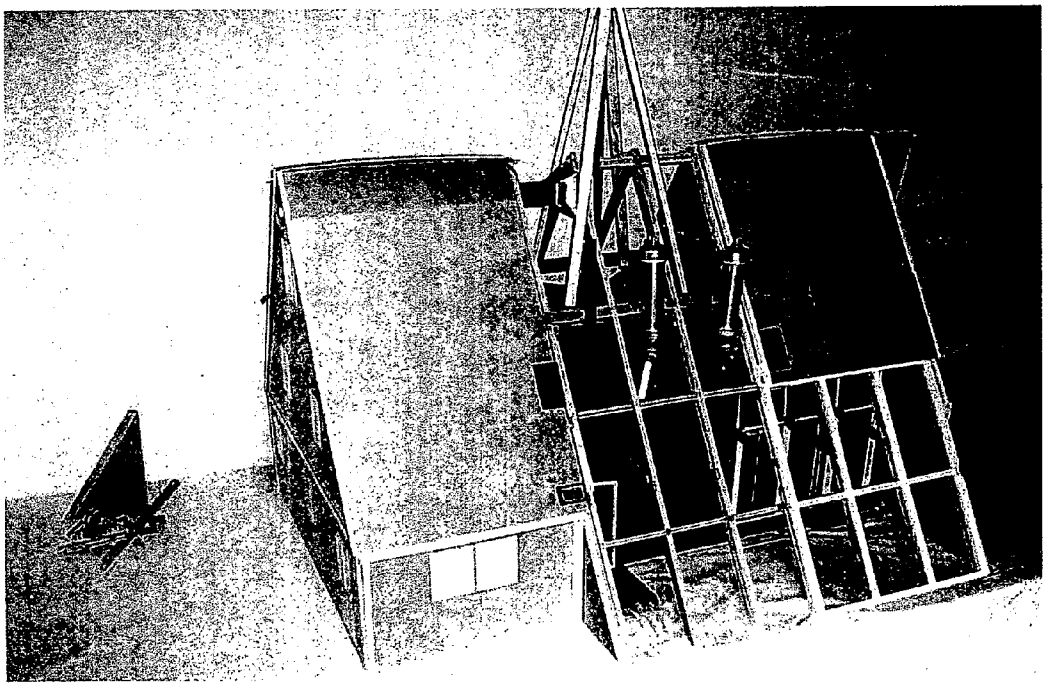


FIG 20B

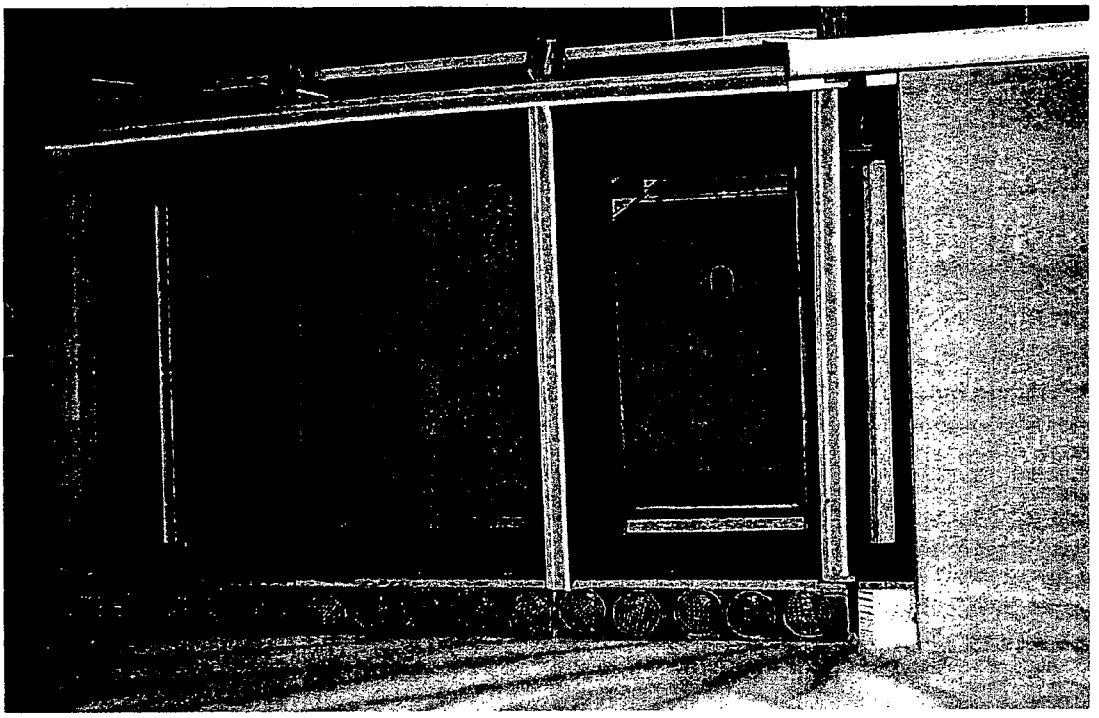


FIG 21A

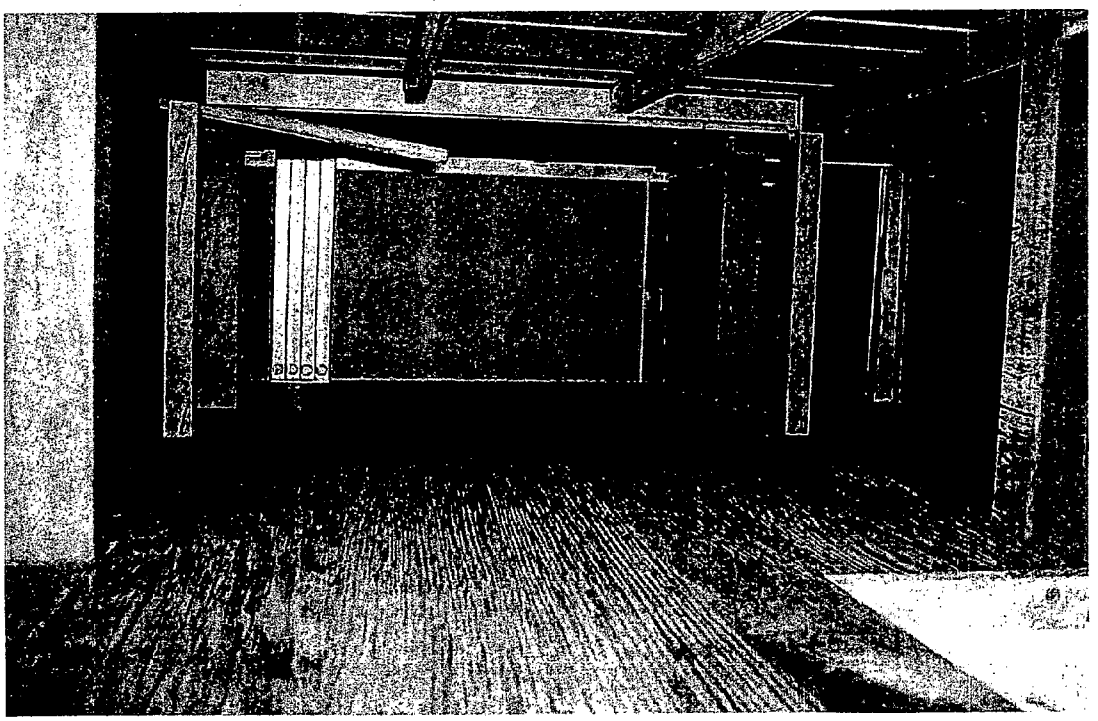


FIG 21B

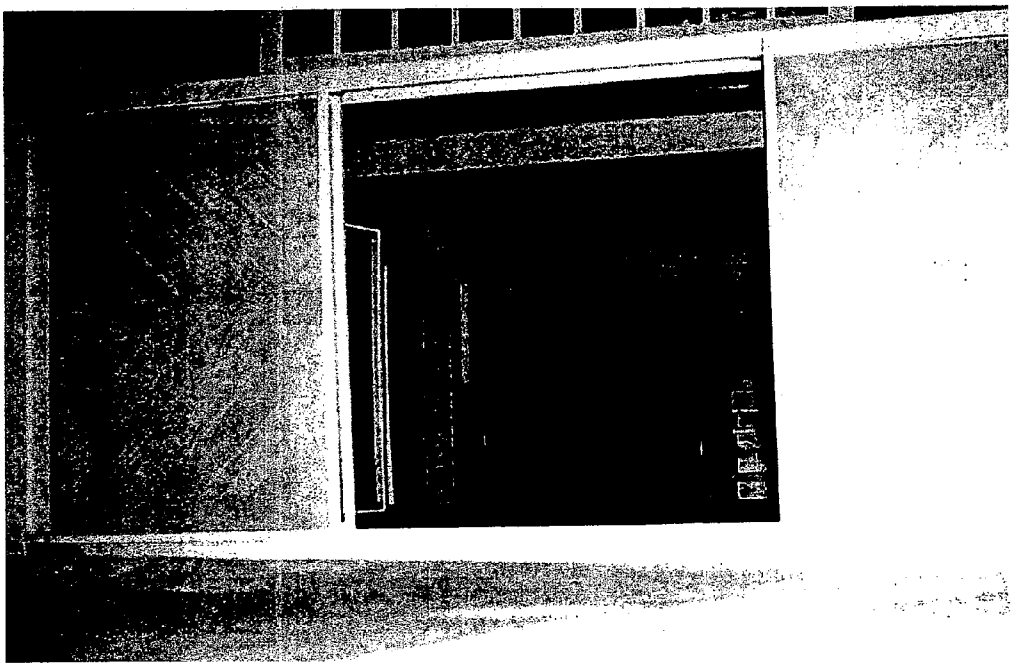


FIG 22A

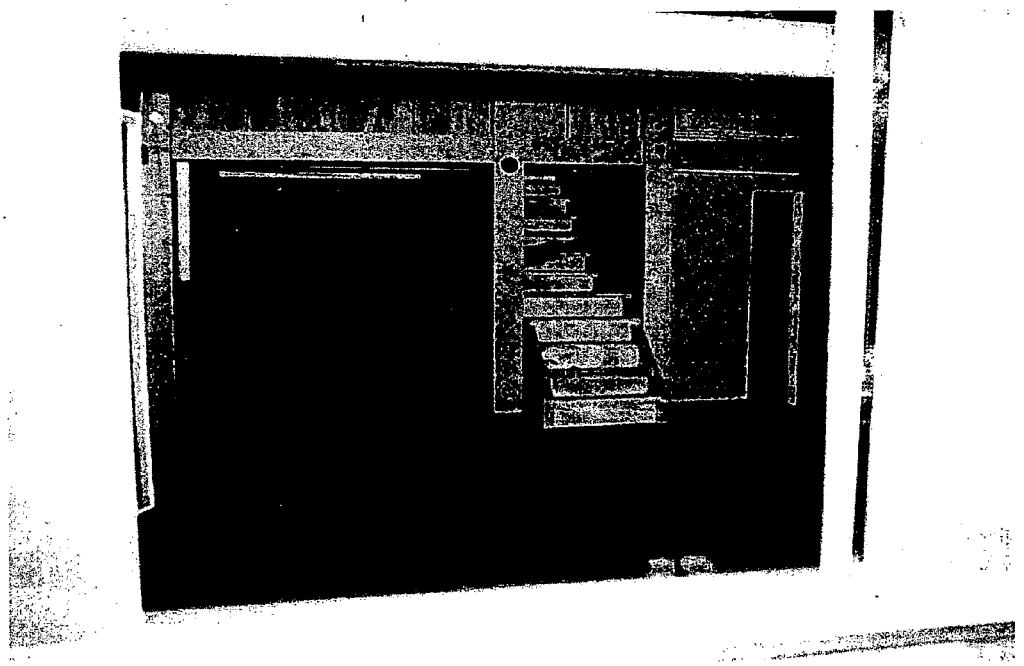


FIG 22B

FIRST HOUSE II

[0001] First House II is a multi-purpose building designed for permanence, energy efficiency and minimal environmental impact. It is an integrated system of materials, components and technologies that interact symbiotically in reaction to climatological extremes. When properly orientated toward the sun, the structure will automatically receive, store and convert radiant energy with no complex system of controls. The building itself is a radiant energy powered, self modulating, dual phase Air Cycle Machine. [Claim]

[0002] It is a pre-manufactured building designed with interchangeable parts. The skeleton is a unique post and beam interior cantilevered frame assembled in interlocking joints utilizing wood that is kiln dried or micro waved prior to being precision cut by a computer. [Claim]

[0003] The exterior skin is non structural and provides for insulation and for the precision installation of standard windows and doors, with no unintended convection, conduction or thermo radiation gain or loss. Exterior skin panels are rigid and bolted to the frame forming a semi-monocoque structure that takes the place of traditional wind bracing beams. The building consists of four post and beam bents to form three bays. It can be constructed all at once, or in phases, according to the economic ability of the owner. [Claim]

[0004] First is the central utility core, which is a stand alone structure containing energy conversion, food and water preparation and disposal and recycling systems. One, two or more bents can be added to the gable ends of the central utility core at any time. All parts and components are precision manufactured and delivered on site once the foundation and the deck have been prepared. Assembly occurs on site with no waste or refuse. Additional bays are added by removing the east or west gable end and inserting a bent. [Claim]

[0005] The wooden post and beam interior cantilever construction of interlocking compression joints will not deteriorate, but will gain structural strength over its unlimited service life. The external insulating skin provides a non biodegradable seal to preserve the interior cantilevered skeleton, floors, doors and walls indefinitely.

[0006] In northern regions, where winter daylight hours are short, full spectrum lighting is provided to the plants in the green house. This enhances plant respiration and air quality and provides indirect light to the living areas. A photo voltaic cell in the green house continues to power the return air fan driving the warmest attic air down to the northwest corner during hours of darkness. [Claim]

[0007] The system sustains and preserves itself naturally, as it sustains organic material including human and plant life. Air flow [Claim] in the closed loop mode converts radiant energy into heat. The warmest air in the greenhouse rises to the top where it is pulled into the Trombe wall by the DC fans. The fans force the air down through the Trombe wall and laterally across the plenum and into the holes in the concrete deck to the north wall of the house. The opened loop exhaust mode requires removal of the insulated plugs above the fans that duct to the turbine ventilators. Reverse the polarity of direct current fans and the direction of rotation reverses. Warm air from the house and green house is then forced up through the turbine ventilators. The return air fan exhausts attic air by removing its insulated plug located in the west gable peak. Warm air exhausts out of the house and is replaced by the coldest air on the north at deck level. In both modes, as radiant energy strikes the house and the photovoltaic cells, the direct current fans move air volume in direct proportion to the intensity of the radiant energy. Rapidly warming air will move rapidly as the radiant energy increases and so does the volume of air moved by the fans per unit of time. The Air Cycle Machine in heat and cooling modes is self regulating. Cooling mode is further augmented by wind driven turbine ventilators. In darkness with still air the house will thermo siphon latent heat through the deck and Trombe wall until daylight returns radiant energy to the system. [Claim]

[0008] Solid and liquid waste disposal is divided into grey water from sinks, washers and drains; and black water from human waste, household dirt and garbage disposal. Solid waste is composted in a tank in the cellar that is vented through the roof near the peak. Grey water drains into concrete basins in the green house. The first basin feeds water hyacinths. Overflow passes through a weir into the second basin containing fish. Thereafter, overflow is leached into the green house soil.

[0009] First House II will be provided to the USPTO in the form of a Computer Assisted Design Program upon recognition by the USPTO that Paul Francis McDonald is the sole inventor.

CROSS-REFERENCE TO RELATED APPLICATIONS

[0010] Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0011] Not Applicable.

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM COMPACT DISC APPENDIX

[0012] See paragraph [081]

BACKGROUND OF THE INVENTION

[0013] First House II was designed in 1980 as an energy efficient house. At that time, the post and beam frame could not be cut without the expertise of a qualified Joiner. Now, after the invention of computer directed machines, large dimension lumber can be dried, precision cut and stored ahead of assembly. Post and beam framing is centuries old, but suffered from the inability to prepare such large components without performing those tasks on site. And the time allowable for erection was always limited by the normal drying characteristics of wood.

[0014] Historically, the Joiner was limited in the complexity of joints cut. The introduction of computer cut frames allow innovation in that centuries old art that are claimed as part of this invention.

BRIEF SUMMARY OF THE INVENTION

[0015] The use of kiln or microwave drying and the computer enhanced ability to precision cut large timbers solve the previously existing problems that ended the general use of post and beam multiple bent construction in favor of contemporary stick housing held together with wire nails

that is only as strong and durable as its weakened and vulnerable skin. In summary, First House II is made from skin and bones, not just a thin exoskeleton. The house can now be pre-manufactured with interchangeable parts and stored in a production facility. It is the same 80% passive solar efficient ecologically sound permanent structure that was designed in 1980. It is capable of being energy independent with no requirement of municipal services.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0016] All views are digital photographs and listed by number; two per page. FIG. **1**A appears on the same page as FIG. **1**B and so on.

[0017] Each dual figure page is numbered consecutively to show the consecutive steps to erect the building.

[0018] The color digital photos are of the actual model. Color is necessary because each color accurately reflects the composition of the material used.

[0019] Color Identification Table:

[0020] Brown: Wood; including post and beam frame, board floors that double as ceilings below and interior walls when the utility core is expanded to include additional bents.

[0021] Green: Single fired (unglazed) ceramic quarry tile flooring on the concrete deck, the exterior masonry of the Trombe wall and solar hot water panels.

[0022] Terracotta: Double fired (glazed) ceramic flue pipes.

[0023] Silver Metallic: Air ducting for vent mode with wind driven turbine generators. And in closed loop with insulated plugs in heat mode.

[0024] Red: Red stripe indicates the interior location of direct current fans inside the air ducting and powered by red bordered photovoltaic cells.

[0025] Black: Flue caps; fire place crane; stove flue and neoprene vibration dampers at the base of the windmill mount.

[0026] Light Blue: Represents water proof sheet rock laminated to rigid extruded fiberglass insulation (grey) in the interior with all weather plywood laminated to the exterior, forming the skin of the building (1980). Now, Light Blue can also represent fly ash-enhanced wall board.

[0027] Dark Blue: Waterless or foam flush toilets, garbage disposal and household dirt recycling. And its vent pipe.

[0028] White with Green Stripes: Grey water drains from sinks, baths and washers.

[0029] Grey: Reinforced concrete with longitudinal holes comprising the first floor deck and heat sink. And, in a thinner dimension, enclosing the utility core appliance areas and second floor bath for fire retardation.

[0030] Copper: Fine mesh screens, air filters or scrubbers where appropriate, depending upon local air quality.

[0031] Brass: Interior hardware.

[0032] White: Non biodegradable polymer of high tensile strength, flexibility and insulating value for gutters (rainwater retention), protection of millwork, roof peak, corners and eaves. Interior masonry of the utility core is Stucco covered with white epoxy. And location of double and single rollout casement windows with Indian shutters are indicated with white.

DETAILED DESCRIPTION OF THE INVENTION

[0033] The invention is explained along with the process of making and using the invention in the sequential series of photographic figures. In this section is a short description of each phase of construction in a step by step sequence. As each dual view figure is explained, the distinguishing characteristics of what is invented and new or improved are explained in the explanation of each figure as they appear in the construction process. The best mode of carrying out the invention is set forth pictorially in this description.

[0034] FIG. **1**A and FIG. **1**B appear on a single sheet of paper as FIG. **2**A and FIG. **2**B through FIG. **22**A and FIG. **22**B appear.

FIG. 1A

[0035] Depicts the three-bay decking options. Middle is the utility core consisting of three reinforced concrete slabs (grey) covered with single glazed quarry tile (green) and wood, with pre-drilled utility holes. One section is not cut to length on site to provide for grey water drainage (white tubes with green stripes). Note: The on-site cut-to-length concrete remnants are saved for entry points to the building which can be sloped for handicap entry.

FIG. 1B

[0036] Shows six concrete slabs (5 cut to length) and joined to a conventional deck of wood, instead of nine concrete slabs for a full width green house. The holes in the concrete are screened, scrubbed or filtered on both ends (copper).

FIG. 2A

[0037] Depicts the wood compression joints. Each dovetail and half dovetail is let into the adjoining timber to preserve the full dimensional strength of each joined beam while strengthening the dovetails that lock the joints. [Claim]

[0038] Where beams intersect at 90° the same technique is utilized to preserve the full dimension strength of both beams through compression. [Claim]

[0039] The round slotted beam, that is fitted into supporting uprights and its bore arched cross beam for hanging walls with doors [Claim] are depicted at the center of the assembled figure.

FIG. 2B

[0040] The fitted joinery

FIG. 3A

[0041] Depiction of the two types of bent in their assembled form. It is an example of the dual function principle [Claim]. Tie beams penetrate through the uprights and extend to function as collar ties to the main rafters which are also floor joists. Tie beams are let into the uprights at full dimension and then reduce in dimension where they penetrate the uprights to continue on as both collar ties and floor

joists. And form the interior cantilever structure. All walls are non weight bearing. [Claim: "Swingle Beam, Joist and Collar ties"]

FIG. 3B

[0042] Depicts the assembled central utility core. White is the masonry wall that serves as wind bracing, fire place and flue (soap stone lined with bricks), and stove flue (black). Built in appliances are not depicted. The Masonry does double duty for the dual mode Trombe wall.

[0043] Blue depicts the toilets, garbage disposal and vent pipe of the composting toilet located in the cellar.

FIG. 4A

[0044] Depicts the dual function Trombe wall (green) shrouded by Plexiglas to form an air plenum.

[0045] Double fired ceramic flue pipes (Terracotta) with caps (black) from the fire place and stove.

FIG. 4B

[0046] Depicts installation of the fireproof reinforced concrete second floor bathroom floor (grey). The stairs, as installed in single bay configuration, and hanging wall (door to kitchen is opened). And the screening, scrubbers or air filters in the concrete decking holes (copper).

FIG. 5A

[0047] Depicts installation of the insulated Exterior Skin panels with doors (light blue laminated to grey insulation and wood) providing kitchen access through the under stair toilet (half bath). Concrete bathroom wall installed (grey). Note: the black iron fire place crane appears.

FIG. 5B

[0048] From a South East perspective depicts installation of green house glass thermo pane glazing and the dual function turbine ventilator (silver) with an imbedded photovoltaic powered direct current reversible flow fan (red). [Claim]

[0049] The second story stairs are installed through the reinforced concrete bathroom wall petitions.

FIG. 6A

[0050] The central utility core enclosing skin depicting Indian shuttered (white) and insulated door locations (wood).

[0051] Non-biodegradable polymer trim, rain gutter and down spout are also color coded white. For the same reason, all breaks, joined parts or holes in the skin are sealed against conduction, convection and radiant gain or loss with insulating and non-biodegradable material (white).

FIG. 6B

[0052] East gable loft access, Indian shuttered windows, transom and sliding doors with polymer trim.

FIG. 7A

[0053] Except for the two roof panels, depicts all of the materials to be added to form the east bay. The entire east facade is removed and reinstalled one bent further out from the central utility core.

FIG. 7B

[0054] East bay assembly with partial installation of ship lapped wood flooring and ship lapped wood curtain walls both of which are slotted into each bent frame. This bay comes with a grooved ridge pole enabling installation of a loft crane. The first four steps of the stairway are moved around the Northeast core upright to form a straight flight to the second floor from the east bay.

FIG. 8A and FIG. 8B

[0055] The enclosed east bay from Northeast and Southeast perspectives.

FIG. 9A

[0056] Depicts components that are removed from the central utility core that will be reinstalled in the west bay.

FIG. 9B

[0057] Depicts the components to be added to the structure to complete the expansion. Not shown are the two roof panels. And the deck, which can be either three additional reinforced concrete slabs with a full house spanning greenhouse or as is depicted . . . . The conventional wood deck option (see FIG. **1**A, FIG. **1**B) with a two thirds span green house.

FIG. 10A

[0058] The east bay framed in. The hanging wall [Claim] has been removed and reversed from the central utility core where the fire proof hanging concrete wall replaces it in the kitchen. Green house access depicts the precision cut insulated skin door installation identical in method to the Indian Shutters. [Claim]

FIG. 10B

[0059] The hanging wall or an additional hanging wall can be moved to the second floor (depicted in the retracted position) to show installation of the Return Air and Attic Vent ducting (silver) with imbedded photovoltaic powered direct current fan (red).

FIG. 11A

[0060] The west bay enclosed. Rain gutter and downspout have been shifted from the North side of the utility core. The dual rollout thermo pane window with Indian shutter is depicted below the return air duct from the interior.

FIG. 11B

[0061] Exterior of the enclosed west gable end showing the return air attic vent in heat mode with insulated plug installed (silver). And the dual pane window installation from the exterior.

FIG. 12A and FIG. 12B

[0062] Details of Indian shuttered window treatment. White rectangles show the location of additional windows. FIG. **12**A shows Return Air mode. And FIG. **12**B, with the insulating plug removed, it is in Vent mode.

FIG. 13A

[0063] Detail of return air ducting. Rafter, purlin with queen butt and swingle collar tie joinery with slots for ship lapped floor/ceiling boards.

FIG. 13B

[0064] Uninstalled detail of single rollout thermo pane window with its Indian Shutter cut from the skin to the precise dimension of the window. [Claim]

FIG. 14A

[0065] One Turbine Ventilator has been rotated outward to show the insulated thermal plug installation for Heat Mode. [Claim]

FIG. 14B

[0066] The insulated plug has been removed allowing the integral sleeve (black) to slide down sealing the duct to the turbine ventilator in Vent Mode. [Claim]

FIG. 15A

[0067] Shows joinery and where the ship lapped uninstalled interior wood curtain walls will insert into the pre-slotted bent frame and butt against the concrete bathroom floor.

FIG. 15B

[0068] Partial installation of interior wall boards butted against the bathroom floor. A loose floor board is angled toward the wall boards. And, when installed, will lock the wood curtain wall into place.

FIG. 16A

[0069] Ship lapped floor boards inserted into bent grooves locking the wood curtain walls into place.

FIG. 16B

[0070] Detail of the Air Cycle Trombe wall and Plexiglas plenum through the concrete deck. The green house and southeast interior doors and glazing are the same and repeated on the west side of the utility core, if a full span green house is selected.

FIG. 17A

[0071] The three bay, four bent house enclosed.

FIG. 17B

[0072] Southeast perspective showing installation of photovoltaic cells (red) and solar water heaters (green).

FIG. 18A

[0073] Second and third floors of the central utility core above the insulated north entry cold hall. Stairs and bathroom entry.

FIG. 18B

[0074] The enclosed house from a northwest perspective.

FIG. **19**Aa

[0075] The full house without central utility core green house glazing or roof. Southeast perspective.

FIG. 19B

[0076] The full house without central utility core green house glazing or roof. Southwest perspective.

FIG. 20A

[0077] Depicts the windmill, utility core bracing and the uprights to the integral cupola and windmill.

[0078] Depicts holes that are precision cut from the skin and are retained to form the insulated plugs with no production waste; identical in method to the precision cut Indian shutters and insulated doors. [Claim]

FIG. 20B

[0079] Windmill installation. And to the left are those materials provided for the phased expansion that are to be returned to the production facility, once the full house is complete.

Note: Additional bents and bays may be added.

FIG. 21A

[0080] When the house is expanded, the preinstalled partitions enclosing the stairs and giving entry to the under stair toilet and kitchen on the right, and stair on the left, have been shifted to the left and right sides of the cold hall. Upon expansion the rear and center partitions are added. This reduces the size of the cold hall (wood floor). The house is now entered on the left into the east bay. The first four steps have been shifted into the east bay. The first floor under stair toilet now becomes a full bath suitable for handicapped needs (grey concrete floor). Entry is from the west bay by shifting the other panel and inserting its door.

FIG. 21B

[0081] Depicts the one way flow return air duct and vents in the northeast corner (silver). Above that, is a round slotted beam showing where a hanging wall, with a door within, is installed. Also not shown is the fire proof kitchen wall where the green floor ends in order to show where the first floor full bath is located.

[0082] The opening in the conventional deck at the lower right is to provide access to the cellar.

FIG. 22A

[0083] Perspective through the sliding doors shows interior glazing and green house access. And the masonry wall with fire place and stove flue.

FIG. 22B

[0084] Depicts the composting toilet to the second floor and the kitchen garbage disposal (blue). To the right is the first four steps and wall partition with insulated door that have been shifted out of the central utility core.

1. The precision cut joinery of all beams are let into all compression joints in their full dimension and constitutes-a structural improvement of post and beam construction (FIG. **2**A and FIG. **2**B).

2. The interior cantilevered bents tied by swingle beams that penetrate the uprights to form collar ties and floor joists forms the skeleton that reduces the span of rafters and joists and transfers all loads to the reinforced concrete deck and heat sink where the uprights are anchored (FIG. **3**A and FIG. **3**B).

3. The dual function principal;
floors are ceilings,
insulating skin is wind bracing,
the first floor deck is the heat sink,
the windmill and lightning rod support embodies the cupola,

the photovoltaic powered return air duct doubles as the attic vent,

Trombe wall masonry contains the fire place, stove flue and appliances,

grey water and composted waste irrigates and fertilizes the green house,

the Swingle beams function as tie beams, collar ties and floor joists,

the beveled angle cut to form an inverse queen butt at the top of the bent uprights support the purlins in the same way that queen posts traditionally supported the rafter purlins,

full spectrum green house lighting enhances plant respiration and air quality and provides indirect light to the living areas.

4. The semi monocoque skin and bones design is a transfer of the technology used in airplane airframe construction that provides flexibility and increased strength compared to a rigid structure. All essential functions are accomplished in the central utility core. And expansion by adding additional bents to form additional bays is the same as adding fuselage plugs to expand by lengthening an airliner fuselage.

5. All openings in the skin are precision cutout and then reinserted as insulated plugs, Indian shutters and insulated doors.

6. The dual function (heat and vent modes) Air Cycle Machine is powered and regulated by radiant energy;

radiant energy conversion into electrical current powers direct current fan motors that reverse rotation and thus the direction of air flow by reversing the polarity of the current to the motors,

radiant energy conversion into heat is regulated in direct proportion to the current provided by the photovoltaic cells,

thermo radiation is forced down via air flow through the heat sink and return air duct in closed loop mode while the tendency of warm air to rise powers thermo siphoning in the opened loop vent mode which is augmented by reversed flow fans, turbine ventilators, the cupola and the return air duct when it is opened to vent mode in the west attic peak,

7. Solar water heating is proportionally regulated by a photovoltaic cell that pumps glycol from the panels on the roof to a heat exchanger in the cellar hot water tank (no drain down).

8. Movable hanging wall(s) with imbedded door form elective room dividers.

9. Interior geometry, with east bay ceilings 50% higher than in the west end core bays, directs warm airflow laterally as in a Russian stove and the return air system perpetuates the cycle at the northwest deck, interior exposed rafters penetrate east and west bay floor/ceilings allowing open perimeter envelope thermo siphon flow in vent mode wherever closeable vents are installed.

10. The sum of the individual claims in symbiotic interaction constitute a Multiple Dependant Claim that is the invention titled FIRST HOUSE II.

* * * * *