Jan. 10, 1967 R. PHILP 3,296,752

PREFABRICATED FOLDABLE BUILDING

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Fig. 1

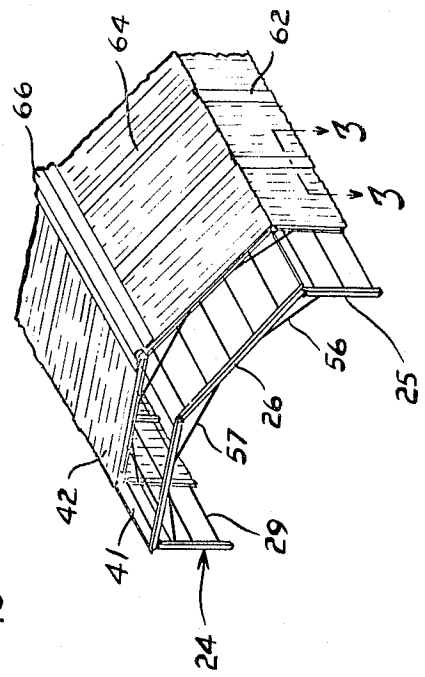
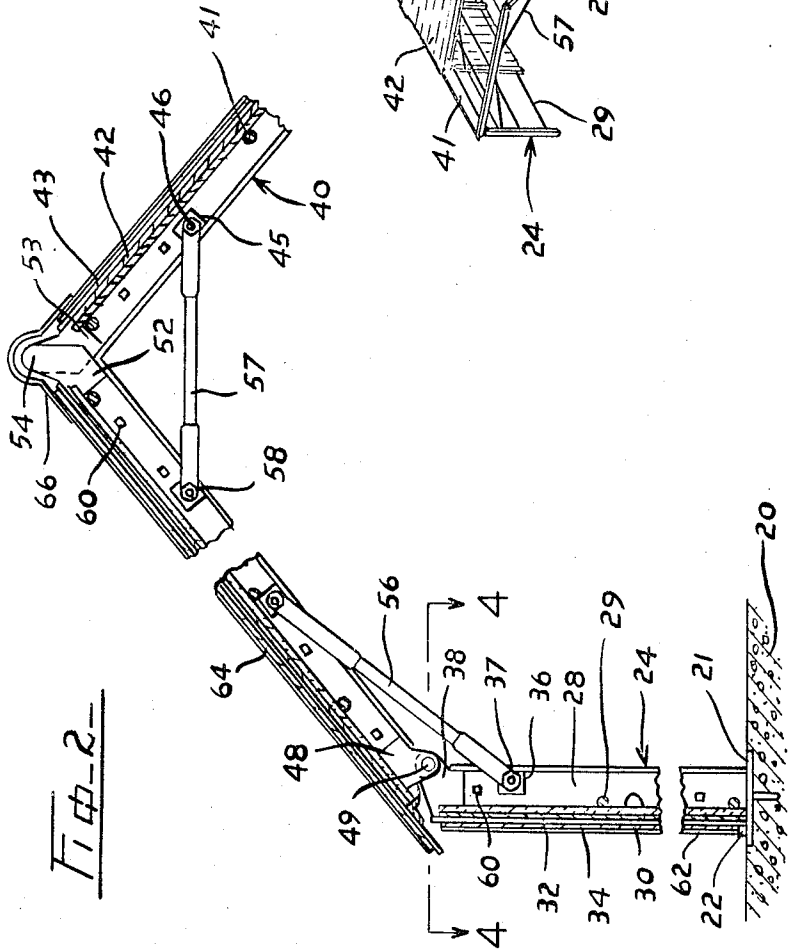


Fig. 2



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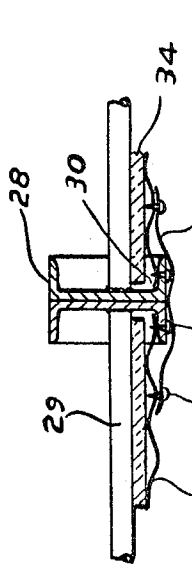


Fig. 3

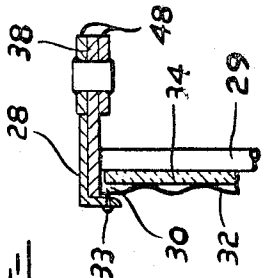


Fig. 4

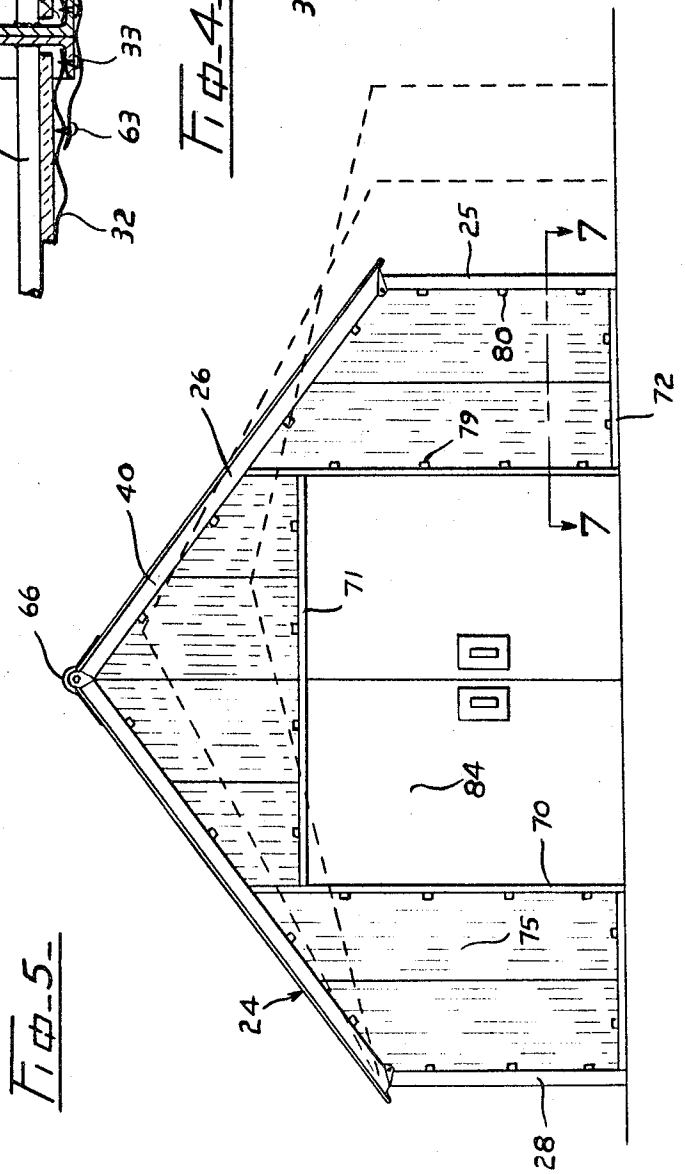


Fig. 5

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Fig. 6

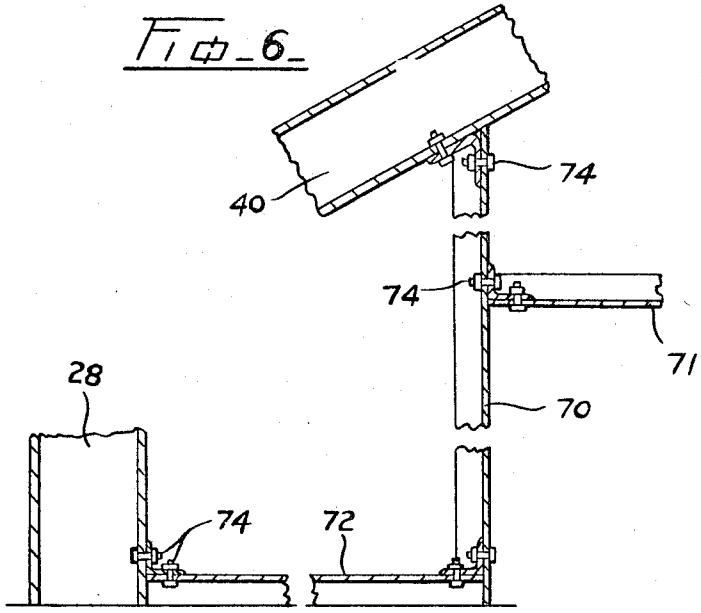


Fig. 7

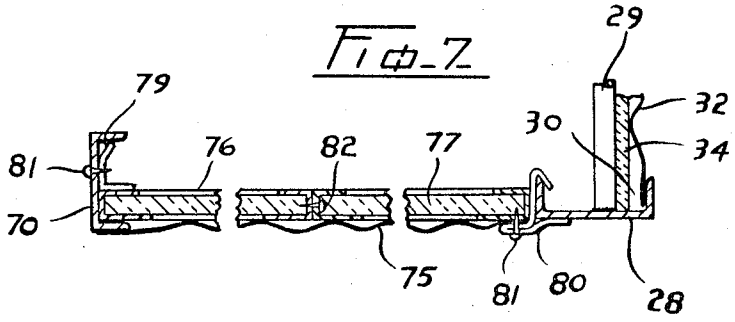
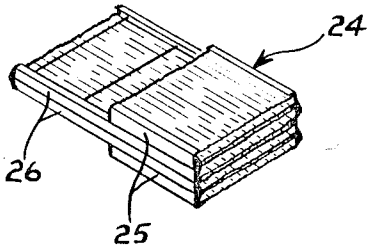


Fig. 8



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United States Patent Office 3,296,752 Patented Jan. 10, 1967

3,296,752

PREFABRICATED FOLDABLE BUILDING

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Filed Feb. 10, 1964, Ser. No. 343,837
2 Claims. (Cl. 52—70)

This invention relates to a building which is constructed and completely assembled at the factory and thereafter is dismantled for shipment to the building site in knock-down and folded form.

The objects of the invention include the provision of a simple building design which is extremely economical to manufacture, to ensure that the largest of the folded or packaged parts of the building is not too great for convenient handling and to enable the building to be erected by unskilled or semi-skilled labour using a minimum amount of tools and equipment.

Another important object is to provide a basic structural unit which may be used to erect buildings of any required length and to provide means whereby the building width may be varied slightly if required.

These and other objects of the invention will appear in the following specification and be shown in the accompanying drawings.

Referring to the drawings:

FIGURE 1 is a perspective view of an end of the building with parts removed.

FIGURE 2 is a fragmentary sectional view of the main structural unit of the building.

FIGURE 3 is a sectional plan view taken on the line 3—3 of FIG. 1.

FIGURE 4 is a section taken on the line 4—4 of FIG. 2.

FIGURE 5 is an end elevational view of the building.

FIGURE 6 is a fragmentary detail view showing the end wall construction.

FIGURE 7 is a sectional plan view taken on the line 7—7 of FIG. 5.

FIGURE 8 is a perspective view of a transverse section folded for transport.

The present building is erected over a foundation which may consist merely of a concrete sill such as is indicated by the numeral **20** in FIG. 2. Embedded in the sill are a number of longitudinally spaced metal plates **21** which are provided near their outer edges with a stop **22**.

The main structural unit of the present building is a transversely extending section **24** made up of side wall frames **25** and roof frames **26** which are hingedly connected together.

Each of the wall frames is constructed of two columns **28** which are spaced some 10 feet apart. The lower ends of the columns rest upon the plates **21** in engagement with the stops **22** and may be secured to a plate part by suitable means, not shown. Preferably the two parallel columns are of channel material with the open sides of the channel being opposed to one another. At suitably spaced intervals the columns **28** are joined together by horizontal rods **29**, the rods being welded to the webs of the channels adjacent the outer flanges thereof. This spacing of the rods with respect to the outer flanges of the channels defines a pair of opposing grooves **30** and lodged in said grooves are the outer edges of a rectangular panel **32**. The panel **32**, preferably a sheet of corrugated and galvanized metal, is suitably secured to the inner face of the outer channel flange by use of self-tapping metal screws **33**. If the side walls of the building are required to be insulated, the grooves **30** are made wide enough to accommodate a layer **34** of insulating material. This insulating material may be bonded to the inner face of the panel **32** or simply be wedged or otherwise fastened between the panel and the rods **29**.

A bracket **36** is secured to each column in spaced relation to its upper end. This bracket is welded to the open side of the channel near its inner flange and serves to support a horizontally disposed bolt **37**. Above the bracket the column is fitted with a hinge plate **38**, the plate being welded to the web between the flanges and having a free end which projects inwardly beyond the inner flange.

The construction of the roof frames **22** is similar in many respects to that of the wall frames. Two spaced rafters **40** form the side edge members of the roof frames and these rafters are connected by rods **41**. A panel **42** is fitted to the frame **40** as before and said panel may be insulated as at **43**. Spaced from each end of the rafters are brackets **45** which support longitudinally projecting bolts **46**. Near their lower ends the rafters are fitted with a pair of hinge plates **48**, the plates having inwardly projecting free ends and being spaced apart so as to receive the hinge plates **38** of the columns **28**. Hinge pins **49** connect the plates **38** and **48** and it will be noted that the pins are located at the intersection of lines projected from the inner faces of the columns and rafters.

The two roof frames are also connected by a hinge structure which consists of plates **52** secured to the upper ends of the rafters of one frame. The rafters of the other frame are each fitted with a pair of spaced apart plates **53** which embrace the plate **52** of the adjoining rafter. A hinge pin **54** extends through the outwardly and upwardly projecting free ends of the plates **52** and **53**. In the roof frames the hinge pins are disposed on the intersection of the planes of the outer surfaces of the rafters.

The wall and roof frames are connected together by diagonal corner braces **56**. These braces are of tubular material and have flattened ends which are apertured to fit over the bolts **37** and the lowermost bolts **46**. Similarly constructed but horizontally disposed ridge braces **57** are fitted to the uppermost bolts **46** of the roof frames. The four corner braces and the two ridge braces are clamped to the opposing brackets **36** by nuts **48** which engage the bolts **37** and **46**.

The sections **24** are secured together by means of bolts **60**. A number of these bolts extend through the webs of the channels forming the rafters **40**. Other bolts **60** similarly connect the abutting webs of the columns **28**. Thus a particularly rigid structure is provided without the need for additional support members within the building.

The joints between the columns **24** are made weather-proof by use of sealing strips **62** which may be corrugated in the same manner as the panels **32**. The strips are secured to the underlapping edges of the wall frame panels by means of screws **63**. Similar sealing strips **64** seal the joints between the roof frames and again screws **65** secure the strips to the panels. The upper ends of the roof strips **64** are covered by lengths of ridge cap **66** which lengths are suitably lapped from one end of the building to the other.

A building constructed of the above described parts may be made of any desired length simply by adding the required number of sections **24**. The sections will allow a limited choice in the width of the building to be constructed. For example, the same frames may be used for the several building widths shown in dotted line in FIG. 5. Increasing this transverse dimension will obviously result in a corresponding decrease in the pitch of the roof but normally this is not too important. The only change required in the building parts so far described is a proportionate increase in the length of the braces **56** and **57**.

The design of end walls for the building and the type of doors with which they are fitted will vary according to the building width and the purpose for which the structure will be used. A typical end wall would consist of jambs **70**, a header **71** and sills **72**. These members are all of channel material and are secured to one another and to

the adjacent parts of the end section **24** by nuts and bolts **74** in the manner shown in FIG. 6. The spaces between these bolted members, excluding the door opening, are closed by a number of panels **75** of the same corrugated material as the side wall and roof panels. The panels **75** are backed by aluminum channel frames **76** and these frames serve to support insulation batts **77**. To secure the aluminum frames to the jambs, the header and the sills, a number of metal clips **79** are used. These clips are suitably spaced about the frames and lock the several parts together as shown in FIG. 7. In somewhat the same manner other clips **80** lock the frames **76** to the columns **28** and the rafters **40**. The clips **79** and **80** are secured in position by self-tapping screws **81** and if necessary other similar screws **82** may be used to secure the abutting side edges of the aluminum frames against displacement. Doors **84** of a suitable design are hung in the normal way in one or both of the end walls.

The entire building may be dismantled by first removing the ends walls and then stripping off the smaller component parts to leave the transvese sections standing by themselves. A section **24** is taken down by removing the braces **56** and **57** whereupon the section may be lowered to the ground and folded. The folding is done by first swinging the side wall frames inwardly so that they rest upon the ground in contact with the now fully extended and horizontal roof frames. The roof frame end wall and wall frame on one side of the section is then swung about the hinge pins **54** into engagement with the other frames. This forms a neat compact package such as is shown in FIG. 8. The folded sections and the other building parts can be loaded on to a truck for transporting to another site. At the site, a small number of men using a gin pole and a few simple tools can re-erect the building in a matter of hours.

What I claim is:

1. In a foldable building structure, the combination of a pair of foundation sills provided with a pair of upstanding abutment menas spaced apart transversely by a distance corresponding to a desired building width, a plurality of individual building units assembled in juxtaposed relation to provide a desired building length, each of said building units comprising a pair of vertical wall sections having their lower edges removably resting on the respective foundation sills in engagement with the respective abutment means whereby to prevent the wall sections from moving apart beyond the desired building width, a pair of upwardly and inwardly convergent roof sections hingedly connected to upper edges of the respective wall sections and hingedly connected to each other at their

point of convergence corresponding to the ridge of the building roof, a horizontal ridge brace extending transversely between and removably connected to said roof sections at points spaced downwardly from the roof ridge, and a pair of removable corner braces extending diagonally from the respective wall sections to the respective roof sections, each of said wall sections and roof sections of each of said building units comprising a pair of spaced parallel side members of a U-shaped cross-section having inner and outer flanges with connecting webs defining a pair of channels open towards each other, a plurality of vertically spaced cross bars extending between and secured to the webs of said side members in inwardly spaced relation from said outer flanges thereof, a covering panel positioned in the space between said outer flanges and said cross bars with its side edge portions projecting into said channels and retained against said outer flanges by said cross bars, means rigidly securing said side edge portions of said covering panel to said outer flanges, and means connecting together the webs of said side members of adjacent building units in back to back relationship.

2. The structure as defined in claim **1** wherein said covering panel is spaced outwardly from said cross bars, and an insulating panel disposed in the space betwen said cross bars and said covering panel.

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