Aug. 13, 1935. C. B. MATHENY 2,010,874

KNOCKDOWN BUILDING

Filed April 11, 1933 2 Sheets-Sheet 1

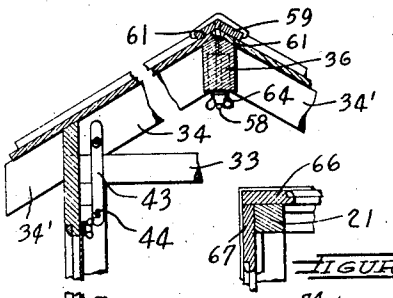


FIGURE 6.

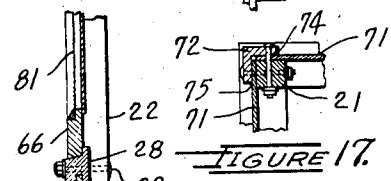


FIGURE 17.

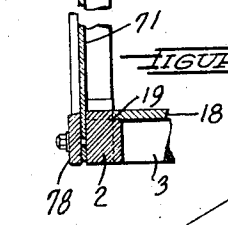


FIGURE 2.

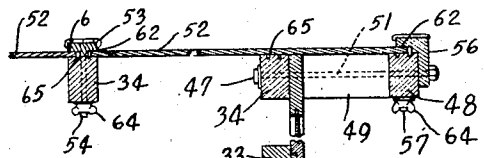


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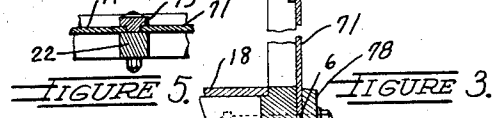


FIGURE 5.

FIGURE 3.

FIGURE 1.

FIGURE 16.

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KNOCKDOWN BUILDING

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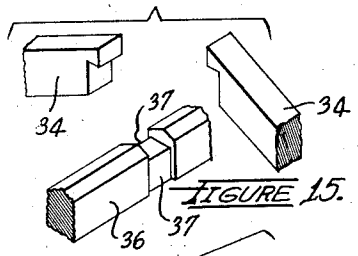


FIGURE 15.

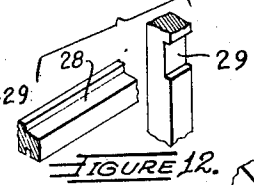
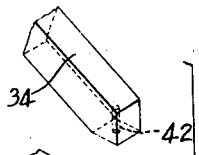


FIGURE 12.



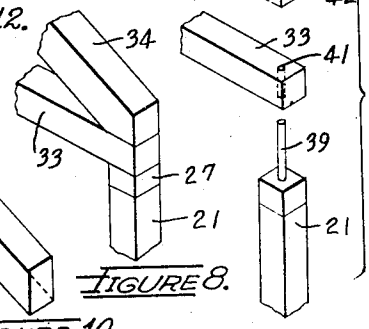


FIGURE 8.

FIGURE 9.

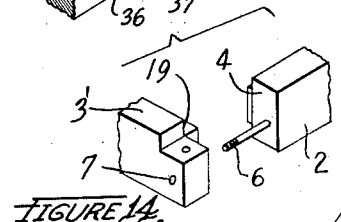


FIGURE 14.

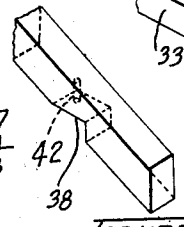


FIGURE 10.

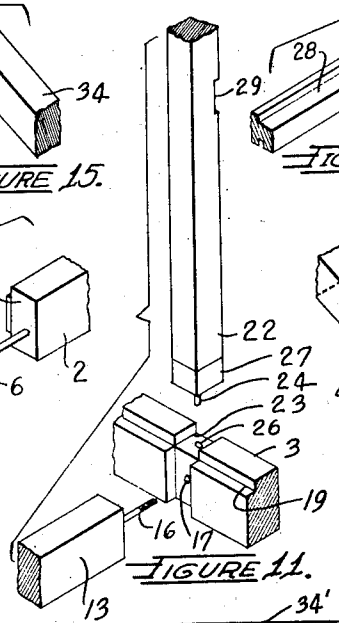


FIGURE 11.

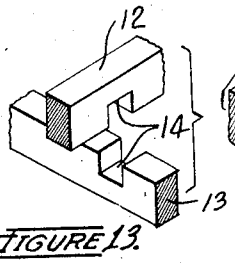


FIGURE 13.

FIGURE 7.

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UNITED STATES PATENT OFFICE

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KNOCKDOWN BUILDING

Charles B. Matheny, Oakland, Calif.

Application April 11, 1933, Serial No. 665,506

10 Claims. (Cl. 20—2)

The invention relates to small buildings of light construction, having the parts so designed as to permit quick assembly for erection of the building or ready detachment for effecting dismantling thereof.

An object of the invention is to provide a building of the character described arranged to be made up practically exclusively of frame members and panels which are designed for interpositioning and interlocking with each other in such manner that both the frame members and panels may be made of extremely thin and light material and yet at the same time the building will be strong and durable when erected, may be quickly taken down or put together, does not require nails and similar fastening means in the erection thereof, and when taken down all the parts thereof may be quickly assembled together in small compact bundles and crated for easy handling and transportation.

Another object of the invention is to provide a building of the character described in which the means for attaching the various members thereof together are formed as a part of such members so that there will be no danger of such means being lost or detached during erection or dismantling of the structure or while the members are in course of transportation.

A further object of the invention is to provide a building of the character described in which the covering panels for the walls and roof are so arranged and combined with the frame members that the use of wall plates for effecting the longitudinal tie of the vertical frame members may be eliminated without impairing the rigidity of the structure.

A still further object of the invention is to provide a building of the character described in which will be provided like frame sections each of which has its parts held together independently of the holding means and parts of the other sections, and in which the various parts in each of such sections are secured together with a minimum of fastening means and with as many of the parts as possible secured together in each section by a common fastening means.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is an isometric view of an assembled building constructed in accordance with my invention.

Figure 2 is a vertical sectional view of a side wall and roof of the erected building with portions removed to reduce the size of the figure.

Figure 3 is a vertical sectional view of an end wall and adjacent roof portion of the building with parts removed.

Figures 4 and 5 are fragmentary horizontal sectional views of wall portions located at intermediate studs of the frame, the planes of the sections being indicated by the lines 4—4 and 5—5 respectively, in Figure 1.

Figures 6 and 17 are fragmentary views similar to Figures 4 and 5, but showing the assembly of parts at the corners of the buildings, the planes of the sections being shown by the lines 6—6 and 17—17 in Figure 1.

Figure 7 is an isometric view of the frame members in erected position.

Figures 8 and 9 are fragmentary isometric views of the frame members at the juncture of a rafter, collar beam, and stud, the former figure showing the parts operatively associated while the latter shows the parts separated.

Figure 10 is an isometric view of the eave end portion of one of the intermediate rafters.

Figure 11 is a fragmentary isometric view of the frame members at the juncture of an intermediate stud, a floor joist and floor sill, the parts being shown in separated relation.

Figure 12 is an isometric view of a portion of a water sill and the portion of a stud arranged to be engaged thereby.

Figure 13 is an isometric view of co-fitting floor joist portions shown disengaged.

Figure 14 is an isometric view of the juncture portions of floor and corner sills.

Figure 15 is a fragmentary isometric view of the frame members at the juncture of opposing rafters and the roof ridge.

Figure 16 is a fragmentary vertical sectional view of the roof in front of one of the gables.

In the preferred embodiment of the invention, the building is arranged to be composed of frame members, panels for the walls, the roof and the floor, and sash units, all of which are formed practically entirely of wood and designed to be secured together in the erection of the building as important elements in the structural composition thereof. The frame members, which are being considered separate of any of the parts of the panels and units partaking of the nature of

structural components of the building, may be conveniently divided into floor members, wall members, and roof members.

The floor members include longitudinal and lateral sills 2 and 3 respectively, which are arranged to be guided for proper positioning and secured together, preferably with an end face 4 of the longitudinals abutting a side of the laterals, by means of screw threaded studs 6 which are anchored in the longitudinals and project from the faces 4 thereof whereby they may extend through perforations 7 in the laterals and be engaged by nuts 8. An effective way of anchoring the studs in the longitudinals is to slot the side of the latter in conformity with the shape of the head 9 and shank portion 10 of the stud, and then plug up the slot after the stud is embedded therein. Arranged to be set within the frame portion defined by the assembled longitudinal and lateral sills is a plurality of floor joists 12 and 13 designed for positioning parallel with the sills respectively in the order last named. The different joists at their intersecting portions are formed, as shown in Figure 13, with complementary notches 14 so that all the joints may be assembled in coplanar relation. Also, as will be clear from Figure 11, the inner side of the floor sills are rabbeted for the reception of the ends of the joists. Proper positioning and retention of the joints between the sills is afforded by means of studs 16 which are similar to the studs 6 and designed for insertion in openings 17 in the sills.

As a flooring for the building there is preferably provided relatively large panels or sections 18 of plywood, that is thin sheets of wood secured together in laminated form, and such panels are laid directly upon joists from sill to sill. A rabbet 19 is provided at the top of the inner edge of the sills of a depth equal to the thickness of the panels so that the latter will be fitted snugly in position.

The frame members for the walls of the building include corner posts 21 and intermediate posts 22 which are both arranged for positioning on the floor sills. The top of the sills is formed with notches 23 for the reception of the lower ends of the intermediate posts, and the latter are provided at such ends with dowel pins 24 arranged to seat in openings 26 in the notched portion of the sills. Preferably the ends of the posts are strengthened with bands 27. For retaining the corner posts in position, the ends of the lateral floor sills are rabbeted and formed with openings similar to the openings 26 for the reception of pins on the posts 21 corresponding to those on the intermediate posts, it being noted that the end faces of the longitudinal floor sills cooperate with the rabbeted portion of the lateral sills in holding the corner posts in position.

In the wall frame of the building of my invention, in the preferred embodiment, I arrange for the entire omission of the usual cross braces and of the plate at the longitudinal juncture of the wall frame and roof frame members, and the only direct longitudinal frame tying element employed, excepting the floor sills, is a water table 28 which is arranged to extend practically completely around the building. The water table is arranged for mounting on the posts and the latter are accordingly provided with notches 29 disposed on the sides lying outermost when the frame is erected, and in which the rear portion of the table is arranged to fit. Preferably the table is arranged to be positioned about midway of the height of the posts and is deleted only between the posts 22' defining the opening or doorway 31 to the interior of the building. Securing of the water table to the posts may be effected by means of bolts 32, one bolt being preferably used for each post whereby a rigid tie-up will be provided.

As parts of the roof frame members may be included ceiling beams 33, rafters 34, and a ridge pole 36. Each ceiling beam, as will be clear from Figure 7, is designed for positioning on a pair of posts at opposite sides of the structure so as to extend across the latter in parallel relation to the lateral joists, the latter, as will also be clear from said figure, having been likewise positioned to extend across the structure from one post to the other. Arranged for support on the end portions of the collar beams are pairs of the rafters 34, each pair being designed for abutment at their inner ends with each other and with the ridge pole 36. The latter is formed with notches 37 in which the inner ends of rafters may be seated. At the corner posts, the outer ends of the rafters are preferably coterminous with adjacent ends of the collar beams, while at the intermediate posts the outer ends of the rafters 34' are extended beyond the beams. In the instance of the rafters 34' a notch 38 is formed in each of them to accommodate the ends of the beams.

It will be noted that the ends of the rafters and collar beams are positionable in superposed relation over the posts, and by reason thereof a single means may be utilized for holding the three members in position together. In accordance with the foregoing the dowel pin 39 in the top of each post is made long enough to permit its simultaneous extension through a hole 41 in the beam and insertion in an opening 42 in the rafter. Locking of the three members in position may be effected, as shown in Figure 2, by means of a hook 43 pivotally carried by the rafter and designed to engage a bolt 44 fixed relative to the post. The ridge is of a length permitting its extension beyond the rafters over the corner posts and it is arranged to be supported on gable panels 46 designed for positioning against the outer side of the last named rafters and the associated beams, the panels 46 as shown in Figure 16 being notched at their upper edge to receive the pole. Securing of the panels in position is afforded by means of bolts 47 which are arranged to extend through the panels and associated rafters and through eave rafters 48 which are adapted for positioning at the ends of the ridge pole in transverse alignment with the other rafters. A spacer 49 is interposed between the corner and eave rafters so as to retain the panel against the former, the bolt 47 being designed to pass through the spacer by way of an opening 51. The gable panels may also be bolted to the beams, and with the panels thus incorporated as part of the means for retaining the roof members together, a most rigid and well knit structure will be provided.

As a covering for the roof I arrange to use sheets 52 of plywood, a sheet being as here shown provided for covering the space between the rafters intermediate and a sheet being provided for covering each of the spaces between the intermediate rafters and the eave rafters. The sheets are held in position along the intermediate rafters by opposed rabbeted battens 53 which are secured to the rafters by bolts 54, and the sheets are held at the eave rafters by corner battens 56 designed to be secured in place by bolts 57. Along the ridge pole is secured by means of bolts 58 a double rabbeted batten 59 between which and

the pole are defined grooves 61 for the reception of the upper edges of the sheets. In a like manner the battens 53 and 56 define grooves 62 with respective associated rafters, and it is in such grooves that the sheets are inserted when placed in position. The various aforesaid bolts for securing the battens in position are preferably provided with specially designed heads engageable with the upper surface of the battens and having elongated portions 63 which are inclined downwardly away from the shank of the bolt so that when the head is drawn against the battens the outer edge portions of the latter will be forcibly pressed against the sheets to thereby insure a tightly sealed joint therewith. Preferably, wing nuts 64 are provided on the bolts for readily securing them in position. Should it be desired to more firmly lock the corner battens in place, the bolts 47 may be extended as indicated in Figure 3 so as to include such battens within the clamped area. An important feature is the provision in the top surface of the rafters, of longitudinal drain grooves 65 to which the side edges of the sheets are arranged to extend, the positioning of the grooves being such that the holes for the batten bolts will be out of communication with the grooves and thus no moisture may escape thereto. With the foregoing construction, should any moisture find its way between the sheets and the battens, it will drain along the rafter to the outer end thereof.

For covering the walls of the structure there is provided for a portion thereof a plurality of sash units 66, 67 and 68. The units 66, as will be clear from Figure 1, are designed for positioning at the longer sides of the building and are each preferably formed as a single member of a width equal to the full length of such sides and of a depth equal to the distance between the rafter table and the portion of the upper surface of the rafters intersected by the vertical plane defined by the outer sides of the posts. The unit 66 is designed to rest on the table and has its upper edge slotted to accommodate the extended portions of the intermediate rafters and be enabled to abut against the roof sheets. In order to secure a rigid interfit with the rafters and posts, the notch 38 in the rafters is enlarged to permit the unit to be inserted and fitted in such notch and retained against the posts. Bolts 44 may be used for clamping the unit 66 directly to the posts, and when so secured the units will not only serve as a covering for the structure, but it will provide an effective reenforcing and knitting element and safely permit the elimination of plate lines. The units 67 and 68 for the front and rear of the building are arranged to extend from the water table to the gable panels and designed for attachment to the posts in a manner similar to that of the unit 66, it being noted however that while the unit 68 for the rear of the building is formed of one piece and arranged to extend from side to side of the building, the unit 67 is formed in two sections one at each side of the doorway.

For the portion of the walls below the water table I prefer to use plywood sheets 71 similar to the sheets utilized for the roof. The sheets 71 are arranged to be held in place by corner and intermediate battens 72 and 73 respectively, designed to be bolted to the posts and defining grooves 74 and 75 for the reception of the side edges of the sheets. The under side of the water table is grooved for the reception of the upper edge of the sheets, and when the sheets are operatively inserted in the grooves the lower edge of the sheets may be covered with a batten 78 arranged to be held in place by nuts 79 engageable with the threaded ends of the studs in the floor sills.

It may be noted that the sash units can be provided with screened openings 81 as here shown, or the openings may be covered with glass or plywood plates if desired. Furthermore at any time the weather permits any of the roof panels may partially or wholly be withdrawn to permit any desired ventilation and openness.

It will now be evident with the various parts constructed and arranged for assembly in the manner described, a building with a sturdy structure and full protective covering may be erected by an unskilled person in an hour or so, and since practically all the parts are straight and flat the ready dismantling of the building and the assembling of the parts in small compact bundles for storage and transportation is easy of accomplishment. It is also to be noted that there are no nails used in the erection, and all that is necessary for securing all the parts together or for taking them down is a single wrench.

I claim:

1. In a building of the character described, a plurality of spaced posts defining the side and end walls of the building frame and having horizontally aligned notches in the outer side thereof, a water table removably mounted and secured in said notches and including one piece members for simultaneously and unitarily engaging and holding the posts defining each side and an end wall respectively, and wooden sash units secured in superposed relation on said table and extending together therewith along as a one piece unit for substantially the full length of the adjoining walls and secured to for holding erect said posts.

2. In a building of the character described, a plurality of spaced posts defining adjoining side and end walls of the building frame, a horizontally disposed water table removably fixed to said walls intermediate the top and bottom thereof and extending substantially continuously from along one of said walls onto and along the other and grooved along the upper and lower surface thereof, a sash frame on said table engaging in the upper groove and secured to said posts and extending together with said table along the walls as aforesaid, and sheets removably positioned below said table and extending from adjacent the bottom of the posts to engage within the lower groove of the table.

3. In a building of the character described, floor frame members removably set together, a plurality of spaced vertical posts removably mounted on said members and defining side and end walls of the building frame, ceiling joists extending across the building from the top of the posts, a ridge pole, rafters supported at their outer ends on the joists and extending inwardly to said pole, means to removably hold together associated sets of posts, joists, and rafters, and a water table removably fixed to the posts and extending substantially continuously from along one wall of the building onto and along the adjoining wall, said water table together with said floor members and ridge pole constituting the sole parts of the building frame providing for the longitudinal tie-up of the remainder of the frame parts.

4. In a building of the character described, floor frame members removably set together, a

plurality of spaced vertical posts removably mounted on said members and defining the side and end walls of the building frame, ceiling joists extending across the building from the top of the posts, a ridge pole extending across the joists in spaced superposed relation, rafters extending from on top of the ends of the joists to each other and to the pole, a pair of one piece gable panels removably secured to the joists and provided centrally at the top thereof with a groove arranged to socket and support the pole adjacent the ends thereof, and means to removably hold together associated joists, posts and rafters.

5. In a building of the character described, floor frame members removably set together, a plurality of spaced vertical posts removably mounted on said members and defining the side and end walls of the building frame, ceiling joists extending across the building from the top of the posts, a ridge pole extending across the joists in spaced superposed relation, rafters extending from on top of the ends of the joists to each other and to the pole, a pair of one piece gable panels removably secured to the joists and arranged to support the pole adjacent the ends thereof, means to removably hold together associated joists, posts and rafters, a horizontally disposed water table extending around the frame and including one piece members for simultaneously and unitarily engaging and holding the posts defining each of said side and an end wall respectively and provided with a groove along the upper sides thereof, sash frames fitted in said grooves and extending together with said table for substantially the entire length thereof along said walls, and means securing said sash frames to said posts and between the joists and rafters.

6. In a building of the character described, a plurality of spaced vertical posts defining frame walls, ceiling joists extending across the building from the top of the posts, rafters overlapping the joists at the outer ends and provided with notches engaging over the ends of said joists, a horizontally disposed water table secured to the posts and extending substantially for the length of a wall, and a sash frame interposed between said table and rafters and fitting within said notches for unitary clamping with said joists and posts and rafters.

7. In a building of the character described, a plurality of spaced vertical posts forming frame walls, ceiling joists extending across the building from on top of the posts, rafters resting on the ends of the joists and having notches within which said ends are disposed, an outside wall member extending in front of said posts and joists and fitting in said notches with one side in engagement for unitary clamping with said posts and the end of the joists, and means to releasably hold together an associated set of posts, joists, and rafters.

8. In a building of the character described, rafters arranged in transversely aligned relation, a T sectioned rabbeted batten mounted on each of the rafters defining therewith grooves extending longitudinally at the sides of the rafters, panels for covering the spaces between the rafters arranged with their side edges slidably disposed in said grooves, and bolts connecting said battens and rafters for clamping said panels in adjustable position in the grooves.

9. In a building of the character described, a ridge pole, transversely aligned rafters extending obliquely thereto each having a longitudinally extending groove in a top surface thereof, T section battens associated with the rafters defining therewith longitudinally transversely extending grooves at the opposing sides of adjacent rafters and communicating with said first grooves, panels for covering the space between said rafters engaged in said second mentioned grooves and with the edges of the panels extending substantially to the first mentioned grooves, said rafters being provided with holes extending substantially vertically therethrough and spaced transversely of said grooves and out of communication therewith, and means to secure the battens and rafters together and clamping said panels and having portions extending through said holes.

10. In a knock down building arranged for ready assembling and dismembering, a skeleton frame comprising, horizontal floor sills, posts vertically mounted against transverse displacement at their lower ends on said sills and defining the sides and ends of the building, and means for holding the posts erect preparatory to and facilitating the addition of other building members comprising a water table extending around the building and including one piece members for simultaneously and unitarily engaging and holding the posts defining each of said sides and an end respectively of the building.

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