July 17, 1956 J. M. KEMP, JR 2,754,862

METHOD OF AND APPARATUS FOR PREFABRICATING WALL STRUCTURES

Filed Nov. 7, 1955 5 Sheets-Sheet 1

Fig. 1.

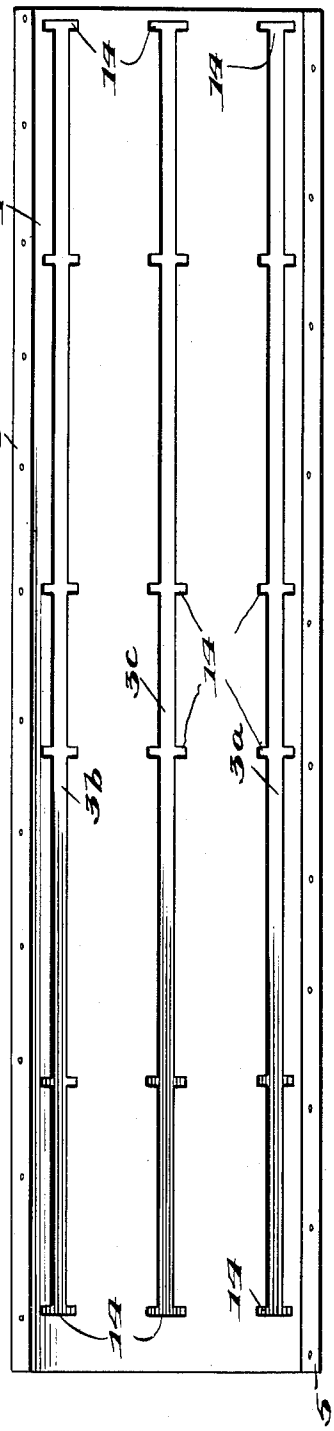

Fig. 2.

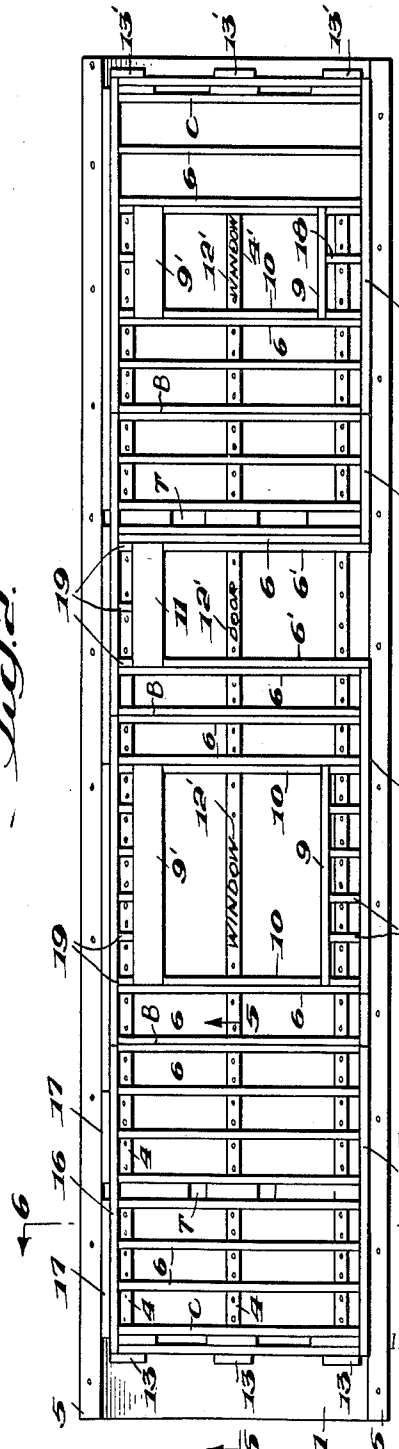

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Fig. 3.

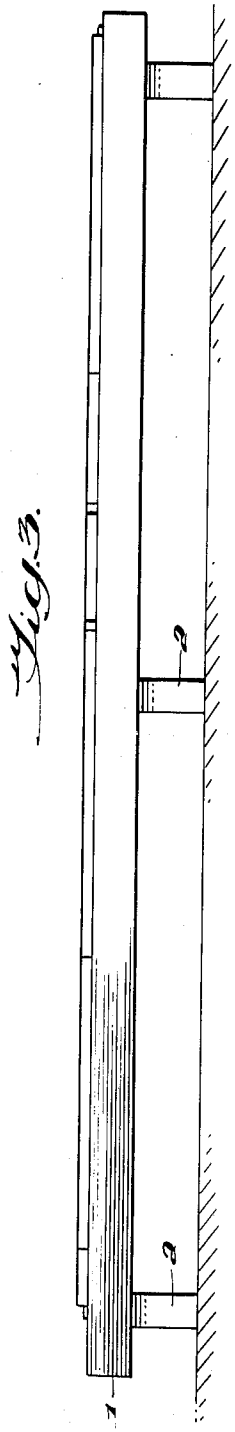


Fig. 5.

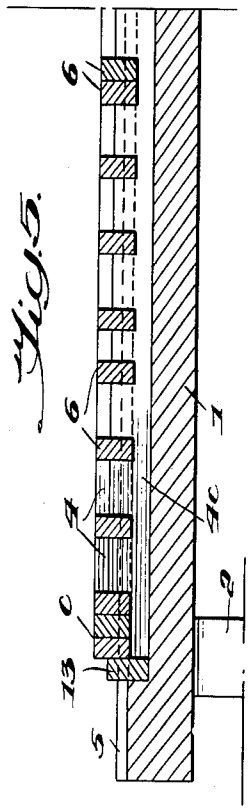


Fig. 4.

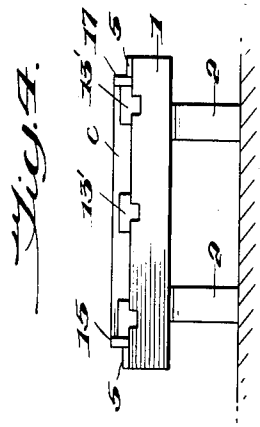


Fig. 12.

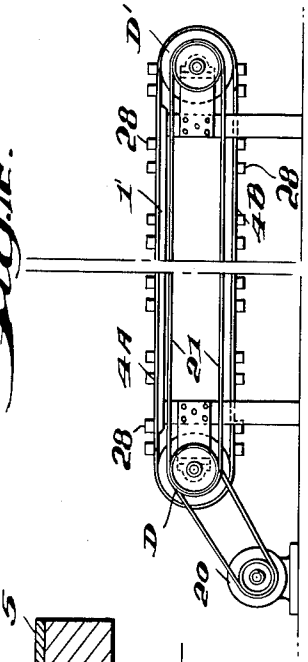
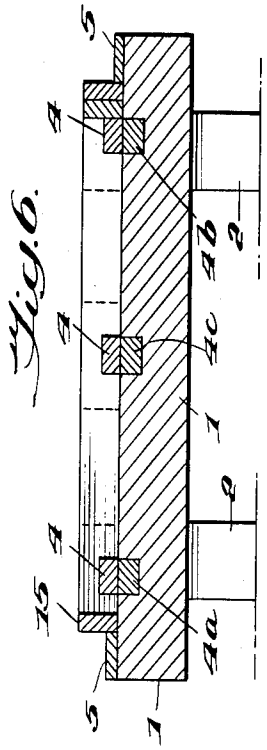


Fig. 6.



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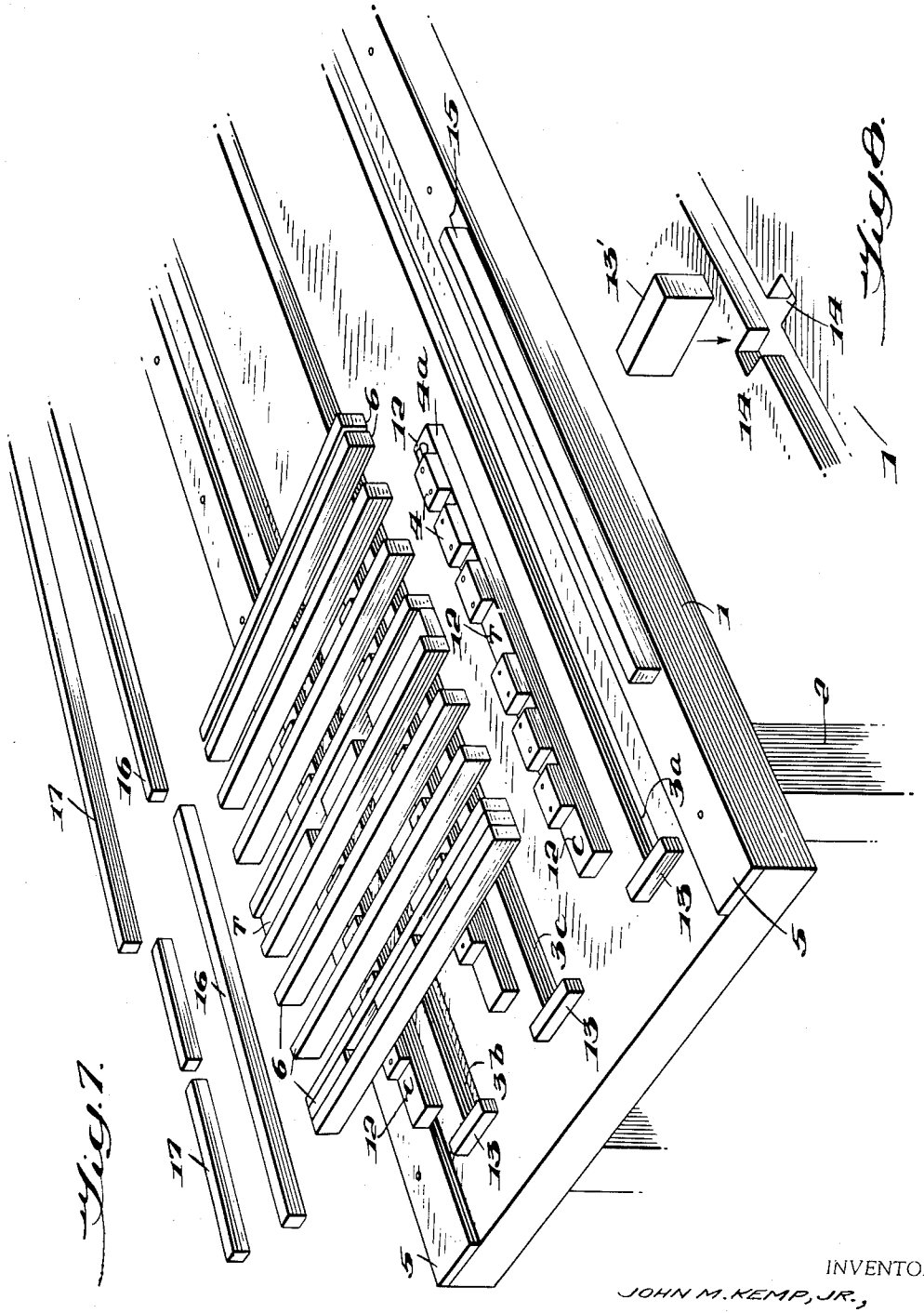

Fig. 7.

Fig. 8.

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Fig. 11.

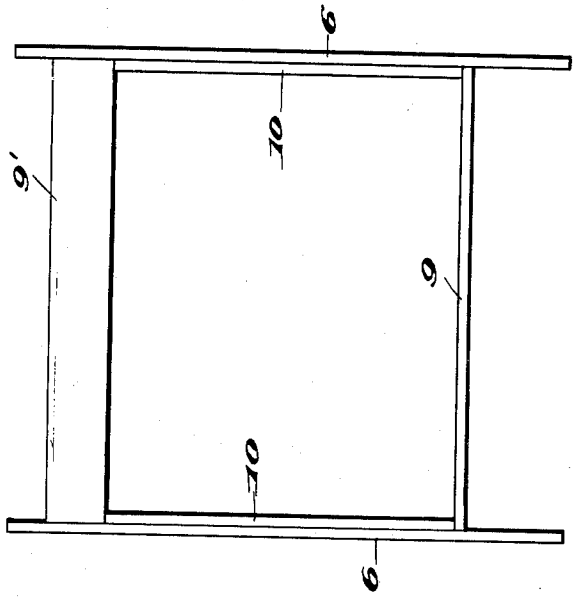

Fig. 10.

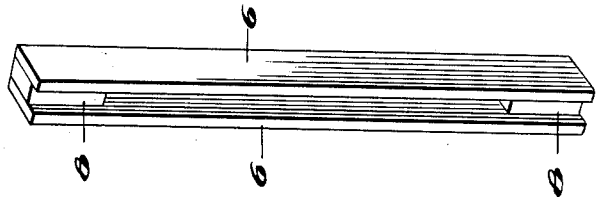

Fig. 9.

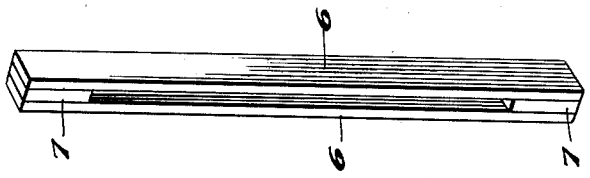

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Fig. 13.

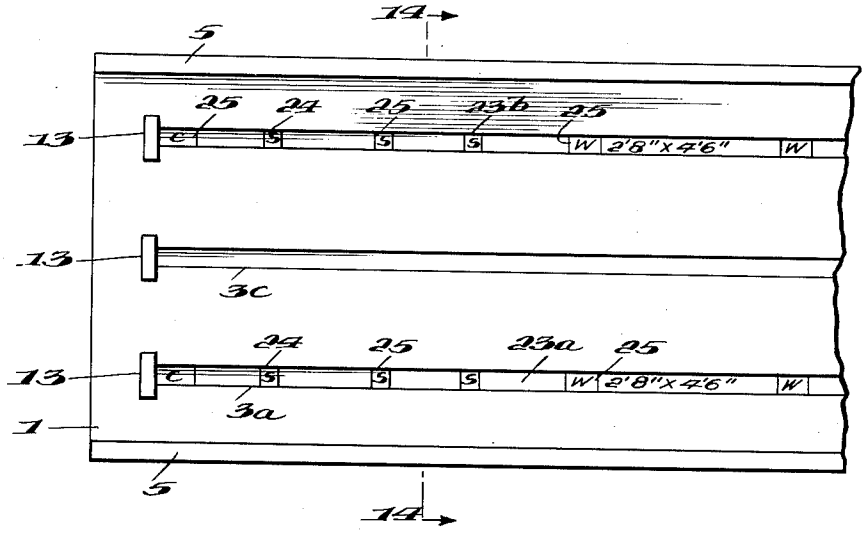


Fig. 14.

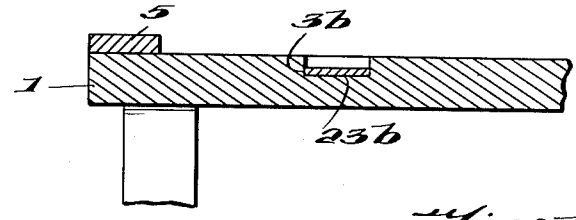
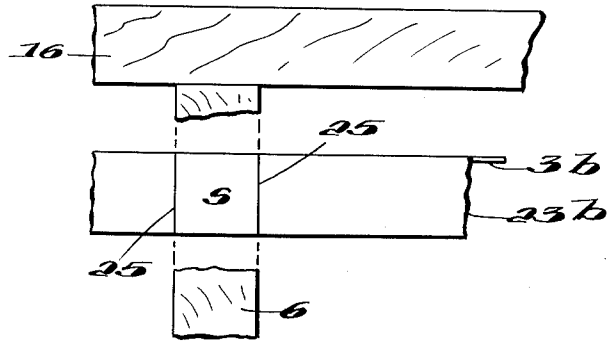


Fig. 15.



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United States Patent Office 2,754,862 Patented July 17, 1956

2,754,862

METHOD OF AND APPARATUS FOR PREFABRICATING WALL STRUCTURES

John M. Kemp, Jr., Chattanooga, Tenn.

Application November 7, 1955, Serial No. 545,301

9 Claims. (Cl. 144—288)

This invention relates to apparatus for prefabricating wall structures, and more particularly to apparatus for prefabricating the exterior and interior walls of frame houses, and is a continuation-in-part of my application Serial No. 408,747 filed February 8, 1954, and later abandoned.

The principal object of this invention is to provide apparatus for prefabricating wall structures which includes a work table on which the framing members that are to form the wall structure are assembled and put together, and at least one pattern member removably supported on the table, the pattern member being provided with spaced indicia thereon signifying the particular types of vertical framing members to be used and also indicating the positions at which such members are to be located. Any desired number of different patterns can be laid out on different pattern members and the work table can very quickly be converted from one wall pattern to another in the short time required to exchange the patterns. Consequently, the same table can be used for different patterns and therefore offers considerable advantages over plants having tables provided with fixed patterns which require a different table for each different pattern and therefore require far more floor area. Also the table cost is so much the greater. Another advantage inherent in the invention is that the patterns may be produced at very low cost and consequently are economically justified even in those situations where a particular wall structure may be required to be duplicated only a few times after which the pattern is discarded. Where fixed jig or pattern tables are used considerable expense is involved in laying out the table and hence the economy sought by prefabrication is often partially offset or even rendered impractical in situations where only a few wall units of a given kind are to be built. As distinguished from tables with fixed patterns, it is known to build the tables with adjustable supports or stops which determine the wall layout on the table. A typical construction is illustrated in United States Patent No. 2,662,565 issued to A. P. Le Vay December 15, 1953, but the principal disadvantage inherent in the arrangement disclosed in that patent is that an inordinately long time is required to change the table over from one pattern to another since each of the adjustable supports, stops, etc. which determine type and location of framing members must be separately rearranged in position on the table. According to the present invention, one removable pattern member contains all the information necessary to lay out the wall on the table and consequently the table can be changed over from one pattern to another very quickly. Since the pattern members are very cheap to produce, an almost unlimited variety of patterns is possible with but little expense. Also, the wall pattern may be "reversed" in a very simple way, namely by reversing the direction of the pattern member on the table.

The present invention is of considerable importance in situations where hundreds of homes are being built in a particular area. One of the principal drawbacks to developments of this kind has been the lack of variety in wall structure available where prefabrication methods are used and such lack stems primarily from the fact that until the advent of the present invention, it was necessary to provide a different jig or work table for each type of wall. The present invention makes it possible to offer a practically unlimited variety of pattern thus eliminating the much abhorred "look-alike" design characteristic of large developments where prefabrication methods are utilized.

Normally, two identical pattern members according to the invention would be located on the table in spaced parallel relation in order to facilitate parallel alignment of the framing members as they are laid out on the table in accordance with the pattern. However, since the wall pattern is determinable by the indicia on only one of the pattern members it is possible to use only one pattern member laid along the table and to provide the latter with a plurality of closely spaced parallel lines running normal to the length of the pattern, and to use those lines for lining up the various framing members parallel to each other on the table.

The removable pattern members according to the invention may take various forms. According to one embodiment to be illustrated the pattern members are made up in the form of elongated strips which can be of wood and two of which are located in parallel spaced grooves in the table. These wood strips carry stops that determine the locations of the various framing members, and the spaces between the stops are used for indicia that indicate the particular types of framing members that are to be inserted at the stops. In accordance with another embodiment of the invention, the pattern members are made up in the form of paper tapes which carry the various notations necessary to select and locate the proper framing members on the table for nailing or otherwise securing together so as to form the wall. These tapes may be located in grooves in the table so as to protect them against damage by the framing members as the latter are pushed about and otherwise handled on the table in locating them to proper position, or the tapes may simply be fastened to the face of the table itself. The tapes will not withstand rough handling as will the wood strips but they do have the advantage that far less storage space is required since the tapes can be formed into compact rolls. Tapes also have the advantage in that they can be laid out with the patterns in an office from architect's drawings and moreover can be sent through the mails.

Also, and what is most important since all of the walls of any house plan including the interior partitions are laid out one after the other on a pattern strip which can be continuous or sectionalized, all of such walls can be prefabricated in essentially a simultaneous manner on the same table in accordance with the wall plan called for by the pattern strip thus resulting in the production of all the house walls which can then be transported, either as complete walls or in sections if any one wall of the pattern is too long for transport, to the site and erected. When all of these walls have been completed, this same house pattern can be run through again to produce all the walls of a second house of the same wall design, or the pattern can be replaced with a different pattern to produce all of the walls of a house of a different design. Consequently, one of the essential charactertistics of the present invention is that all of the walls including interior partitions in accordance with any particular house pattern are produced in sequence on a work table as distinguished from the conventional practice wherein wall panels standardized to different but predetermined design are prefabricated and then different house plans are then devised to utilize these panels.

The foregoing objects and advantages inherent in the invention will become more apparent from the following detailed description of the embodiments referred to above and from the accompanying drawings in which:

Fig. 1 is a plan view of the work table of one embodiment of the invention;

Fig. 2 is a top plan view of the table with pattern members and the framing elements of a wall assembled thereon;

Fig. 3 is a side elevation of the table and assembly of Fig. 2;

Fig. 4 is an end elevation of the same;

Figs. 5 and 6 are cross-sections on lines 5—5 and 6—6 of Fig. 2;

Fig. 7 is a fragmentary exploded view of the left end of the table, the pattern members and associated wall framing members;

Fig. 8 is a fragmentary perspective view of a portion of the table top and a removable stop for the pattern members;

Figs. 9 and 10 are perspective views of corner and T framing members respectively;

Fig. 11 is a front elevation of a framing unit for a window;

Fig. 12 is a schematic side elevation of a modified form of the invention.

Fig. 13 is a fragmentary plan view of the work table illustrating a modified construction wherein the pattern members are constituted by tapes;

Fig. 14 is a vertical transverse fragmentary section on line 14—14 of Fig. 13; and

Fig. 15 is a fragmentary plan view of the table drawn to an enlarged scale showing a portion of the pattern tape and the framing members laid out upon it.

In the drawings, the reference numeral 1 identifies the top of a work bench or table on legs 2 which support the horizontal work surface of the table at a convenient height above the ground or floor. The construction is rugged to withstand hammering during the nailing together of wall components which are assembled on the table top. The table top is preferably rectangular and of such dimensions that the largest wall structure for a particular building project may be assembled upon the table.

The generally planar work surface of the table is provided with a plurality of parallel grooves 3*a*, 3*b* and 3*c* which extend longitudinally of the table to support removable pattern members 4*a*, 4*b* and 4*c*, respectively, which have longitudinally spaced stop blocks 4 secured thereto for positioning the various vertical framing members which are to be incorporated in the wall structure. Guide means in the form of rails 5 are secured to the top of the table, or to the sides of the table to project somewhat above the working surface, and serve as guides or stops for dressed 2 x 4 strips which are to form the sill and top plate of the wall.

In Figs. 1 to 11 of the drawings, the transverse dimensions of the pattern members and framing members are greatly exaggerated since it is not practical to illustrate the cross-sections of these elements on the scale employed for the longitudinal dimensions.

For convenience of description, the side of the table adjacent groove 3*a* will be considered to be the front of the table and that the bottom of the wall is to be at the front of the table. While three grooves and pattern members are shown, it is to be understood that only the front and back grooves 3*a*, 3*b*, and the associated pattern members 4*a*, 4*b* are essential but that it is usually preferred to include the central groove 3*c* and its pattern member 4*c* to facilitate the vertical alinement of the preformed framing members which are to be positioned in the transversely alined spaces between corresponding stop blocks 4 of the pattern members.

The framing members may be dressed 2 by 4 studs 6 cut to proper length, or composite members preformed from pairs of such studs 6 and interposed spacing pieces 7 in the case of corner posts (Fig. 9) or studs 6 and wider spacing pieces 8 in the case of T's (Fig. 10) for incorporation in an exterior wall at points where interior partition walls are to join the exterior wall.

Framings for doors and windows or other openings are also prepared in advance and stocked for inclusion in the wall structures. A frame unit for a large double hung window, as shown in Fig. 2, may include side studs 6, a lower spacer 9, an upper header 9' and reinforcing strips 10 at the inner faces of the studs between the spacer and header.

A door frame unit, as shown assembled in the wall structure in Fig. 2, comprises a pair of inner studs 6 which are backed up by shorter studs 6' and spaced by a header 11.

The spaces between stop blocks 4 of the pattern members 4*a* and 4*b* bear indices 12 to indicate the type of framing member which is to be inserted in that particular space. The indicia 12 may be, for example, the letter "C" to indicate a corner post, the letter "T" to indicate a T such as shown in Fig. 10, the letter "S" to indicate a single stud, or the letter "B" to indicate a break, i. e. two studs at a point where the wall is to be separated or broken into separate sections for transport to the building site. The indicia 12' for door or window frame units is preferably placed on filler blocks 4' of the central pattern member 4*c* which are positioned to extend across the openings in the respective frames.

Alined stops 13 of T-shape are fixed across the several grooves adjacent one end of the table top 1 to position the ends of the respective pattern members in transverse alinement, and similar T-shape stops 13' may be fixed or removably seated in transverse seats 14 at the other ends of the several grooves. Preferably alined sets of seats 14 are formed at different distances along the grooves for the reception of stops 13' to alter the effective lengths of the grooves when shorter pattern members are to be used, or to subdivide the grooves for the reception of a plurality of sets of relatively short matching pattern members.

After all the vertical framing members are assembled on the table top in the spaces provided between the sets of stop blocks 4 and 4', a sill member 15 of initially random length is set upon the table top adjacent the front guide rail 5 and pushed to the left to abut against the forward stop 13 at the end of the table. The assembled vertical framing members are pulled forwardly to seat against this sill member and it is marked and cut in alinement with the meeting faces of the two studs 6 set in the first break space which was indicated by indicia "B" of the pattern members 4*a*, 4*b*. Additional sill members 15 are cut and placed in sequence across the ends of the further framing members towards the other end of the table. Upper plate members 16 are then placed against the rear guide rail 5 and nailed to the vertical framing members, and cap plates 17 are then nailed to the plate members 16; it being noted that the plates 17 must not extend over the plates 16 in vertical alinement with the corner posts or T's of the vertical framing since side or partition walls are to be joined to the described wall structure at these points. The sill 15 can then be nailed to the vertical framing members as the cap plates bear against the rear guide rail 5 which forms a rigid backing for the nailing operation.

Short fillers 18 and 19 precut to length from stock stud material are then inserted between the window and door units and, respectively, the sill members 15 and plate members 16.

When the framework is thus fully assembled, a desired sheathing is nailed thereto to form the outer surface of the exterior wall.

It is to be understood that when heavy transport machinery is available it is not necessary to divide a long exterior wall into sections for transport to the building site where it is to be erected upon a prepared foundation.

The inner wall surface of lath and plaster or wall board is applied after the exterior and partition walls are erected and, in general, the partition walls are completed in only skeleton form on the table and both surfaces are finished in desired style after erection in the house.

A particular advantage of the invention is that a large number of different house patterns can be made up at very low cost, and each pattern is also reversible end-to-end on the table for even greater variety in the appearance and interior design of the houses of large building developments. The apparatus may be set up in a large shed at the building area so that wall construction may be carried on during inclement weather. The pattern members may be continuous strips of wood, or they may be made in sections for storage in a minimum space when a large number of house patterns are desired for a particular project.

Alternatively, as illustrated in Fig. 12 the house patterns may comprise stop members **28** secured to flexible bands of stainless steel or other appropriate material. In this case, a matching set of house pattern bands 4A or a plurality of sets of matching bands 4A, 4B may be connected end to end to form endless belts supported on drums D, D' at opposite ends of the assembly table 1' and synchronously driven by a motor **20** and connecting belt **21**, at a relatively low speed longitudinally of the table. Workmen spaced along the table may then progressively assemble the different components on the moving pattern belts, whereby the complete walls each as a unitary assembly or as a series of sections will be discharged from the far end of the assembly table.

Another embodiment of the pattern members is illustrated in Figs. 13–15. In these views it will be seen that the pattern members are comprised of flat strips **23***a*, **23***b* made of any suitable material which are preferably laid in grooves such as the grooves **3***a* and **3***b*, in the table **1**. The strips **23** are provided with indicia **24** to indicate the type of framing member which is to be inserted in that particular space. Thus, as with the pattern members **4***a*, **4***b*, **4***c* of the previously described embodiment, the letter "C" is used to designate a corner post, letter "S" designates a stud, letter "W" designates a window, etc. The flat pattern strips **23***a*, **23***b* differ from the pattern members **4***a*–**4***c* in that transverse lines **25** are placed on the tape adjacent the lettered indicia to locate the positions of the various framing members on the work table. Such lines therefore serve the locating function of the longitudinally spaced stop blocks **4** on pattern members **4***a*, **4***b* and **4***c*. Thus, for example, as indicated in Fig. 15 a portion of the pattern strip **23***b* is seen to include the letter "S" for a stud **6**, and the two parallel lines **25** on the strip serve to locate the stud, the distance between the lines being equal to the thickness of the stud which, although generally referred to as a 2 x 4, actually has a thickness standardized at 1⅝". The end of the stud **6** is then nailed to the plate member **15**. Two of the pattern strips **23***a*, **23***b*, each identical as to pattern indicia will suffice to locate the various framing members in their alined, i. e. parallel spaced relation on the table. It is conceivable that even one pattern strip **23***a* or **23***b* can be used if the table is provided with a grid or a series of closely spaced parallel lines extending transversely to the axis of the strip. Thus one end of each framing member can be located by one worker at one side of the table by the indicia and lines on the pattern strip, and the other end can be located exactly transverse to the length of the pattern strip by another worker at the opposite side of the table by reference to the series of transverse lines marked out on the table.

The advantages inherent in the flat pattern strips **23***a*, **23***b* are that they are less costly to produce than the pattern members **4***a*, **4***b*, **4***c* which require the application of stop blocks thereto in order to determine the locations of the various framing members which are to make up the wall. Moreover, the flat strips **23***a*, **23***b* may be constituted by paper tape or some equivalent flexible material

which can be easily rolled up and stored in a relatively small amount of space. Furthermore, the tape rolls are admirably suited for laying off the complete patterns for one or any number of houses at a desk, the person laying out the patterns unrolling the tape and simply marking it directly from the architect's plans. Also, patterns on tape can be easily sent through the mails thus offering wide possibilities for nationwide application of prefabrication principles with practically limitless variety of house patterns.

In conclusion it is to be understood that the invention is not limited to the particular embodiments and constructions herein shown and described since various other changes which may be made in the design and relative arrangement of the component parts fall within the spirit and scope of the invention as set forth in the following claims.

I claim:

1. Apparatus for prefabricating the walls of a house in accordance with a particular house plan comprising an elongated work table having an area sufficient to lay out and form the walls, guide means along the longitudinal edges of said work table to locate the longitudinal framing members and provide a backing for securing the cross-framing members thereto, at least one pattern strip member having indicia therealong significant of the locations of the different types of cross framing members such as corner posts, T's, studs and breaks to be used in making up the walls of the house and also significant of the regular and irregular spacing between the various types of cross framing members, and means removably securing said pattern strip member to said work table so as to enable it to be replaced by another pattern strip member having indicia thereon representing the walls of a different house plan, said pattern strip member also being reversible end-to-end with respect to its position on said work table thereby to effect a reversal of the pattern and hence a reversal of the walls to be fabricated on said work table.

2. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said pattern strip member is constituted by a strip of material having stops thereon locating the respective positions of the framing members according to the pattern.

3. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said pattern strip member is constituted by a strip of flexible material such as paper tape.

4. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said pattern strip member is constituted by a strip of flexible material having stops thereon locating the respective positions of the framing members according to the pattern.

5. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said pattern strip member is constituted by a strip of flexible material having stops thereon locating the respective positions of the cross framing members according to the pattern and wherein said means for removably securing said pattern strip member to said work table includes means for shifting said pattern strip member longitudinally along said work table.

6. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said pattern strip member is sectionalized into lengths for storage, and said lengths are laid end-to-end on said table when the walls are fabricated.

7. Apparatus as defined in claim 1 for prefabricating the walls of a house wherein said means for removably securing said pattern strip member to said work table comprises a groove extending longitudinally of said work table and in which said pattern strip member is received.

8. A method of simultaneously prefabricating a plurality of walls of a house in accordance with a particular house plan and dividing them into interfitting and transportable units, said method comprising the steps of preforming an elongated pattern strip for the plurality of

walls in the house plan, said pattern strip including indicia thereon significant of the different types of cross framing members such as corner posts, T's, studs and breaks to be used in making up the walls and also significant of the locations of such cross framing members, removably securing said pattern strip on an elongated work surface, arranging the cross framing members on said work surface in accordance with the indicia on said pattern strip, placing longitudinal framing members at the ends of the cross framing members, securing the longitudinal framing members to the ends of the cross framing members, and removing the completed walls and wall sections as determined by the breaks noted on said pattern strip from the work surface for transport.

9. A method of simultaneously prefabricating a plurality of walls of a house in accordance with a particular house plan and dividing them into interfitting and transportable units, said method comprising the steps of preforming an elongated pattern strip sectionalized into lengths for the plurality of walls in the house plan, said pattern strip including indicia thereon significant of the different types of cross framing members such as corner posts, T's, studs and breaks to be used in making up the walls and also significant of the locations of such cross framing members, removably securing said lengths of said pattern strip in end-to-end relation on an elongated work surface, arranging the cross framing members on said work surface in accordance with the indicia on said pattern strip, placing longitudinal framing members at the ends of the cross framing members, securing the longitudinal framing members to the ends of the cross framing members, and removing the completed walls and wall sections as determined by the breaks noted on the pattern strip from the work surface for transport.

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