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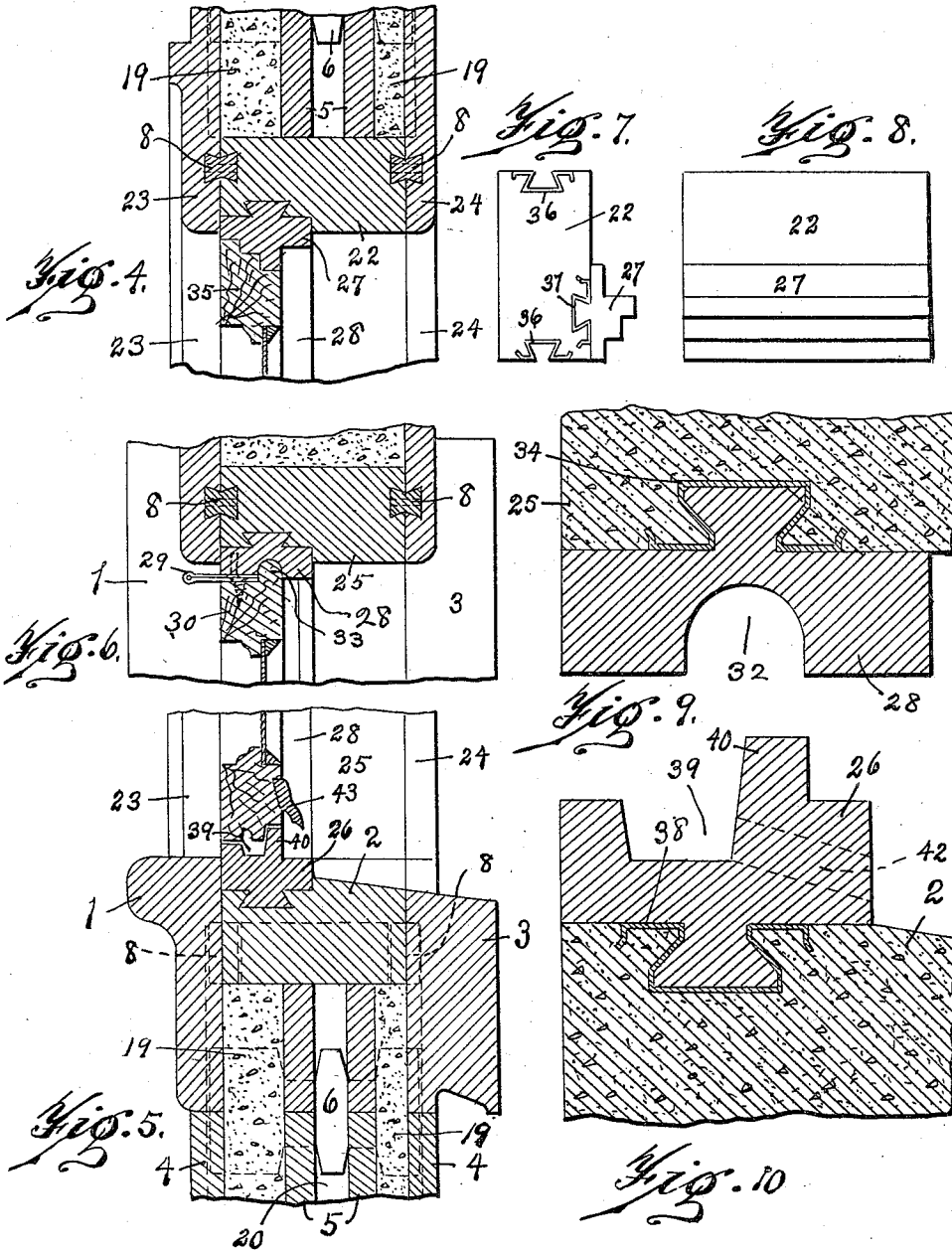
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R. Z. HOPKINS

BUILDING CONSTRUCTION

Filed Oct. 30, 1920

4 Sheets-Sheet 2



WITNESS:

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INVENTOR

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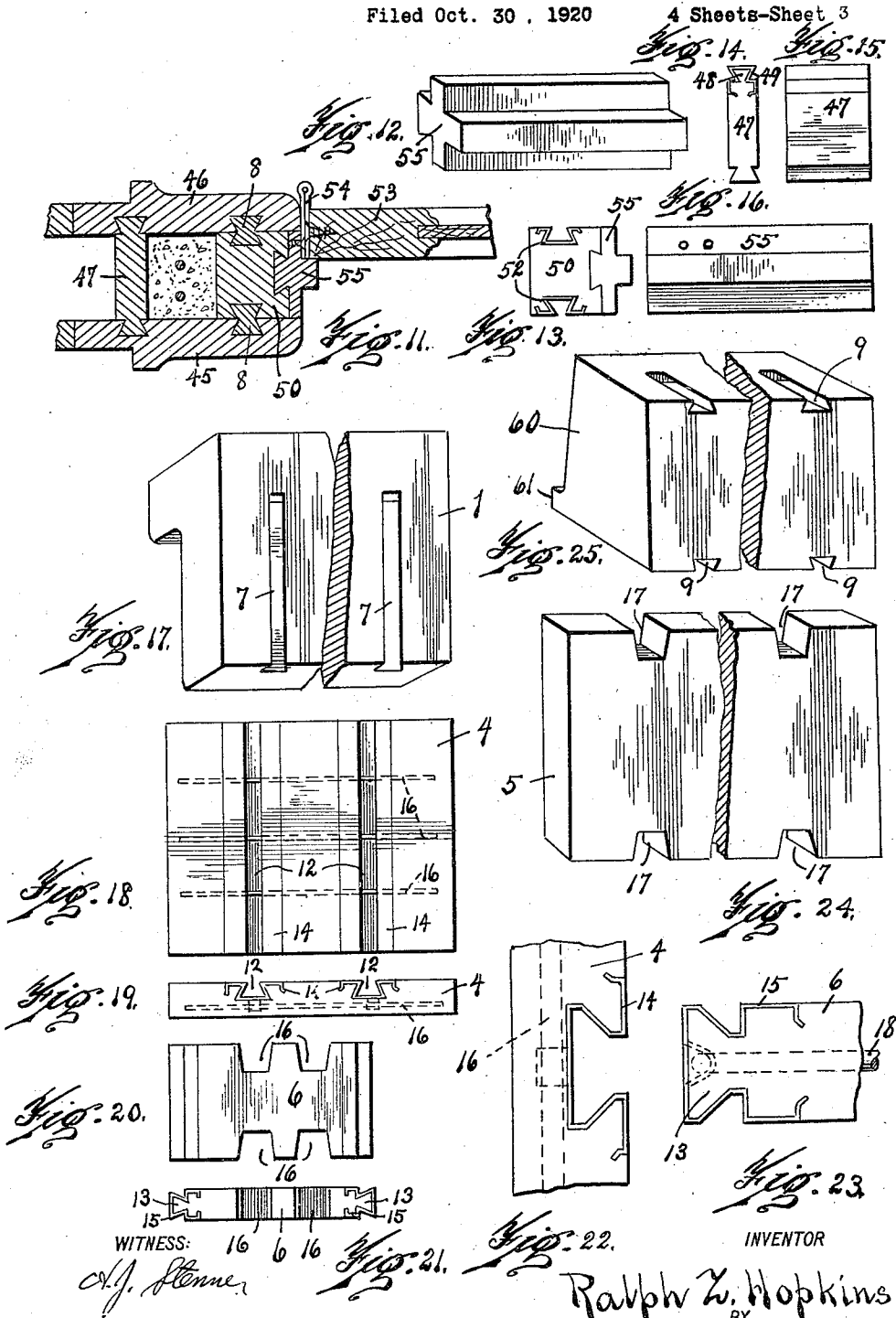
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4 Sheets-Sheet 3



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Fig. 21.

Fig. 22.

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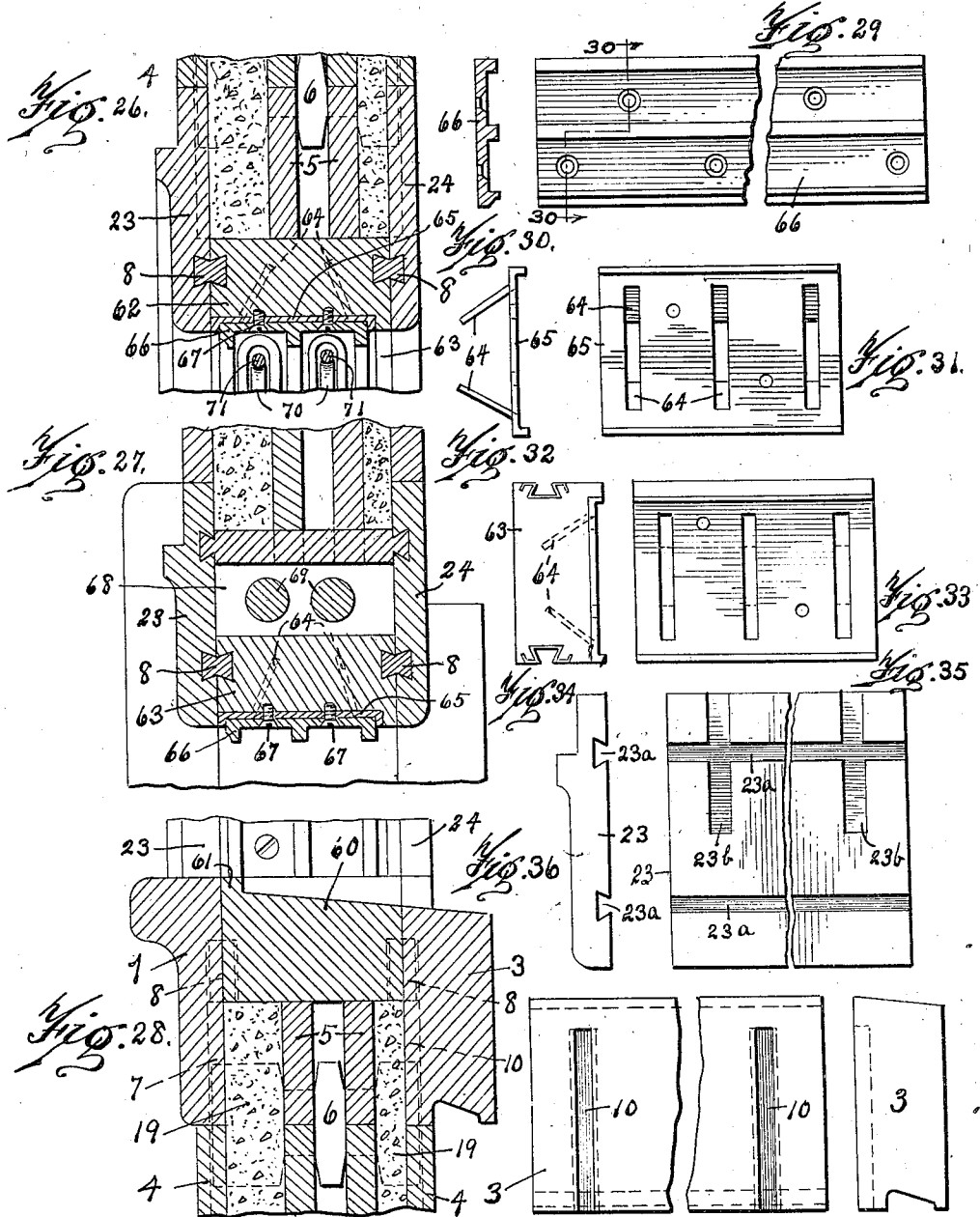
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4 Sheets-Sheet 4



WITNESS:

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*Fig. 37.*

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*Fig. 38.*

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## UNITED STATES PATENT OFFICE.

RALPH Z. HOPKINS, OF DETROIT, MICHIGAN.

BUILDING CONSTRUCTION.

Application filed October 30, 1920. Serial No. 420,710.

*To all whom it may concern:*

Be it known that I, RALPH Z. HOPKINS, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Building Construction, of which the following is a specification.

This invention relates to the construction of the frames of window and door openings for reinforced concrete buildings, particularly of that class of buildings wherein the outer surfaces of walls, floors and roofs are constituted by blocks or units which are of stock or standard sizes and which are preferably produced at a conveniently located factory, concrete being poured into the spaces between the units after they are placed in proper position, wherever desirable.

This invention consists in a novel combination of units or blocks adapted to be held together when assembled by connectors which may be separate from or formed on the units, as shown in the drawings and particularly pointed out in the claims.

In the drawings, Fig. 1 is an elevation of a portion of a building wall. Figs. 2 and 3 are sections on the lines 2—2 and 3—3 of Fig. 1, respectively. Fig. 4 is a vertical section of the lintel of a casement window embodying this invention, and Fig. 5 is a similar section of the sill thereof. Fig. 6 is a horizontal section through a hinge of this window. Figs. 7 and 8 are an end view and an elevation respectively of a lintel unit. Fig. 9 is a horizontal section on a large scale of a hinge unit. Fig. 10 is a vertical section on a larger scale of a sill unit. Fig. 11 is a horizontal section through a door jamb showing the casing, door and hinge. Fig. 12 is a perspective view of a facing or stop member thereof. Fig. 13 is an end view of the unit embodying this facing member and the reinforced backing therefor. Figs. 14 and 15 are views of a tie plate. Fig. 16 is a side view of a jamb unit. Fig. 17 is a perspective of an inner sill unit, also shown in Fig. 5. Fig. 18 is an inner elevation and Fig. 19 a plan of a wall unit. Fig. 20 is an elevation and Fig. 21 a plan of a wall tie-plate. Fig. 22 is a plan of a section of a reinforced wall unit and Fig. 23 is a plan of the end of a wall tie-plate adapted to engage therewith. Fig. 24 is a perspective of an interior wall unit. Fig. 25 is a perspective of a center sill unit, also shown in Fig. 28. Fig. 26 is a vertical section of a window lintel. Fig. 27

is a horizontal section of one side of a window frame. Fig. 28 is a vertical section of a window sill. Fig. 29 is a bottom plan of a guide plate for window sash and Fig. 30 is a section on the line 30—30 thereof. Fig. 31 is a bottom plan and Fig. 32 is an end view of a supporting plate for the sash guides. Fig. 33 is a plan and Fig. 34 is an end view of a center unit for the side walls and lintel of a window frame. Fig. 35 is an interior and Fig. 36 an end elevation of a facing unit for the window frame. Fig. 37 is a rear view and Fig. 38 is an end view of an exterior window sill unit.

Similar reference characters refer to like parts throughout the several views.

Fig. 5 shows a section of a window sill made up of three different sets of sill units 1, 2 and 3, supported by the wall of the building which is likewise built up of outer wall units 4 and 5 held together by the tie-plates 6. These units are all molded in advance, preferably at a properly equipped factory and are so formed that they may be attached to each other by means of properly formed connectors or by interlocking tongues. The inner sill units 1 (also shown in Fig. 17) are formed with dovetail grooves 7 to receive connectors 8 (such as shown in Fig. 6), which unite them to the intermediate sill units 2, as indicated in dotted lines in Fig. 5, the unit 2 being generally similar to the unit shown in Fig. 25, having the same dovetail grooves 9.

An outer sill unit 3 is shown in Figs. 37 and 38 with its grooves 10 to receive connectors 8 to unite it to the intermediate sill member 2. The inner and outer sill members rest on the outer wall units 4 while the intermediate members 2 rest on the intermediate wall units 5. These wall units 4 are shown in Figs. 18 and 19, provided with grooves 12 to receive the tongues 13 on the ends of the tie-plates 6 (Fig. 21). If desired, these tongues and the walls of the grooves 12 may be reinforced by means of the metal shells 14 and 15 respectively, which serve as molds for the adjacent portions of these concrete building units. The wall units 4 may be reinforced by means of rods 16, as shown in Figs. 18, 19 and 22, and such rods may be placed wherever desired, as for instance, the rods 18 employed to secure the shells 15 of the tongues 13 (Fig. 23).

The tie-plates 6 and the intermediate wall units 5 may be formed with notches 16 and

17 (Figs. 20 and 24) respectively so that they may be laid up in a wall, as shown in Figs. 5 and 28. After these units have been laid up, concrete 19 is poured into the spaces between them, an air space 20 being left if desired. The concrete will combine the building units into a rigid structure.

In Fig. 4 are shown the lintel units 22 united to the inner casing units 23 and outer casing units 24 by means of connectors 8. The intermediate wall members 5 rest directly on the lintel units 22 and the outer wall units 4 may rest on the window casing units 23 and 24. These casing units extend across the top and then down the sides of the windows, as shown in Fig. 6, and are united to the vertical and intermediate frame units 25 by means of the connectors 8 which extend into grooves 23<sup>a</sup> or 23<sup>b</sup>, depending on whether the units are at the top or side of the opening. When the sill units 2, the lintel units 22 and the upright units 25 for either door or window openings are cast, the stop members 26, 27 and 28, respectively, may be placed in the molds so that the concrete will unite positively with these stop members, these being formed with dovetail tongues to make the connection more effective. These stop units are preferably of iron.

Any desired number of hinges 29 are secured to the upright stop members 28 and to the side frame members 30 of a casement window sash or door. The parts 28 are preferably formed with a groove 32 to receive the rib 33 on the sash or door. If desired, a properly fashioned strip 34 of metal may be molded in the member 25 and the stop unit 28 afterwards slid into position, as indicated in Fig. 9. The stop units are not necessarily of the same length as the concrete block to which they are attached, as they may be made longer so as to break joints with the blocks.

The units 27 (Fig. 4) are preferably stepped to fit the stepped upper member of the sash, to insure water-tight joints, and, if desired, the concrete blocks 22 may be molded onto sheet metal reinforcements 36 and 37 to receive the connectors 8 and the stop members 27 respectively, as indicated in Fig. 7. The intermediate sill members 2 may also be molded onto the sheet metal forms 38 (Fig. 10) which are adapted to receive the stop units 26. These stop members are formed with gutters 39 and the ribs 40 are preferably formed with drainage passages 42. A shield strip 43 of rubber or wood may be attached to the bottom member of the window sash (Fig. 5).

In Figs. 11 to 16 inclusive a construction adapted for doors and casement windows of the same general design is detailed, Fig. 11 being a horizontal section through vertical side members of the casing and door. The

facing units 45 and 46 are united by tie-plates 47 which are shown to have their tongues 48 protected by the sheet metal members 49 (Fig. 14). The intermediate members 50 are united to the facing blocks 45 and 46 by means of connectors 8, these members 50 having grooves which receive the connectors faced by means of the sheet metal members 52 (Fig. 13), if desired. The vertical member 53 of the door is connected to the stop members 55 by the hinges 54.

Figs. 26 to 38 inclusive show a window frame adapted for a sliding-sash, which frame may embody the same inner sill units 1, outer sill units 3, wall units 4, 5 and 6, concrete fills 19, inner face plates 23 and outer face plates 24 as the window and door frames just described, and the same connectors 8 may be used to unite these units. The intermediate sill members 60 (Fig. 25) have grooves 9 and upwardly extending flanges 61 which prevent rain splashing up back of the lower sash of the window. Connected to the inner and outer face units 23 and 24 at the top of the window opening are the units 62, and at the sides are the vertical units 63, and secured to them by means of the tongues 64 are the shallow channels 65 to which the sash guides 66 may be connected by means of the screws 67.

The sections of these guides 66 which are secured to the lintel 62 may be of any desired length, but for each of the upright sides of the casing I prefer to use three sections, when the upper and lower sliding sashes are of substantially the same height, and to have the upper and lower sections of the same length and the middle section somewhat shorter. The upper and lower sections 66 may be released and removed when the sash are slid down and then up, after which the middle sections may be released and permitted to slide down. The sash may then be swung out.

The wall adjacent the window openings is preferably formed with a space 68, Fig. 27, for the sash weights 69. Pulleys 70 for the sash cords 71 may be of any desired structure and mounted in the plates 66 in any desired manner, recesses being left in the units 63 for the pulleys and cords. Any other desired means may be employed to counterbalance the sash. The channels 65 may be omitted if desired and any other means may be used to hold the guide plates 66.

The several units may all be reinforced by providing sheet metal shells for selected surfaces, as indicated in Figs. 13, 21 and 22, wherever such reinforcements may be found advisable.

While the construction is particularly adapted for window and door openings, it is

not limited thereto, for such units as shown in the drawings may be employed for base boards, plate rails and such other architectural details as may be conveniently manufactured.

The details of the several units may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:

1. A frame for an opening in a wall, said frame consisting of inner and outer facing units adjacent said opening and arranged in vertical and horizontal rows, jamb and lintel units between the facing units and also arranged in vertical and horizontal rows, all said units being precast and formed with registering grooves, and connectors mounted in said grooves to unite the units into frames.

2. A frame for an opening in a wall, said frame consisting of inner and outer facing units adjacent said opening and arranged in vertical and horizontal rows, jamb and lintel units between the facing units and also arranged in vertical and horizontal rows, all said units being precast and formed with registering grooves, and connectors mounted in said grooves to unite the units into frames, adjacent facing units of the vertical rows having the ends toward the openings in the same plane and the opposite ends staggered.

3. A frame for an opening in a wall, said frame consisting of inner and outer units for facing all sides of the wall adjacent said opening, jamb and lintel units between the facing units all the units being precast, means to connect the adjacent units, and metal plates attached to the jamb and lintel units.

4. A frame for an opening in a wall, said frame consisting of inner and outer units for facing all sides of the wall adjacent said opening, jamb lintel units between the facing units all the units being precast, means to connect the adjacent units, metal plates attached to the jamb and lintel units, and guide plates for window sashes attached to the metal plates.

5. A frame for an opening in a wall, said frame consisting of inner and outer units for facing the wall at all sides of said opening, jamb and lintel units between the facing units all the units being precast, means to connect the adjacent units, metal plates attached to the jamb and lintel units, and guide plates for window sashes attached to the metal plates at each side of the window opening, one of the guide plates being positioned at the middle of the height and at each side of the opening and other guide plates both above and below said middle plate.

6. A frame for an opening in a wall, said

frame consisting of inner and outer units for facing the wall at all sides of said opening, jamb and lintel units between the facing units all the units being precast, means to connect the adjacent units, metal plates attached to the jamb and lintel units, guide plates for window sashes attached to the metal plates, said wall being formed with chambers for sash weights between the side facing units and back of the jamb units, the guide plates and supporting plates being formed with recesses for sash-cord pulleys at the top of the opening, and sash pulleys mounted in said recesses.

7. A frame for an opening in a wall, said frame consisting of inner and outer facing units adjacent said opening and arranged in vertical and horizontal rows, jamb and lintel units between the facing units and also arranged in vertical and horizontal rows, all said units being precast and formed with registering grooves, connectors mounted in said grooves to unite the units into frames, and a concrete filling between the facing units after the units have been erected.

8. A frame for an opening in a wall, said frame consisting of facing units adjacent said opening, jamb units between the facing units, said units being precast and having registering grooves, and connectors to unite the jamb and facing units.

9. A frame for an opening in a wall, said frame consisting of facing units adjacent said opening and jamb units between the facing units, said units being precast and having registering grooves, connectors to unite the units, and detachable ribs mounted on the jamb units.

10. A frame for an opening in a wall, said frame consisting of facing units adjacent said opening and jamb units between the facing units, said units being precast and having dovetail grooves, and connectors having dovetail ends uniting the units.

11. A frame for an opening in a wall, comprising units constituting an end surface of the frame and facing units on each side of such first named units, all of such units being precast and having registering grooves, and connectors in the grooves to unite the units.

12. A frame for an opening in a wall, comprising units constituting an end surface of the frame and facing units on each side of such first named units, all of such units being precast and having registering grooves, connectors in the grooves to unite the units, said facing units having additional vertical dovetail grooves registering with each other, and connecting plates extending across between said facing units and having their ends dovetailed and fitting said dovetail grooves.

RALPH Z. HOPKINS.