Feb. 7, 1950 J. J. WAGNER 2,496,571

FORM FOR CONSTRUCTING TILE-FACED CONCRETE WALLS

Filed Jan. 11, 1949 4 Sheets-Sheet 1

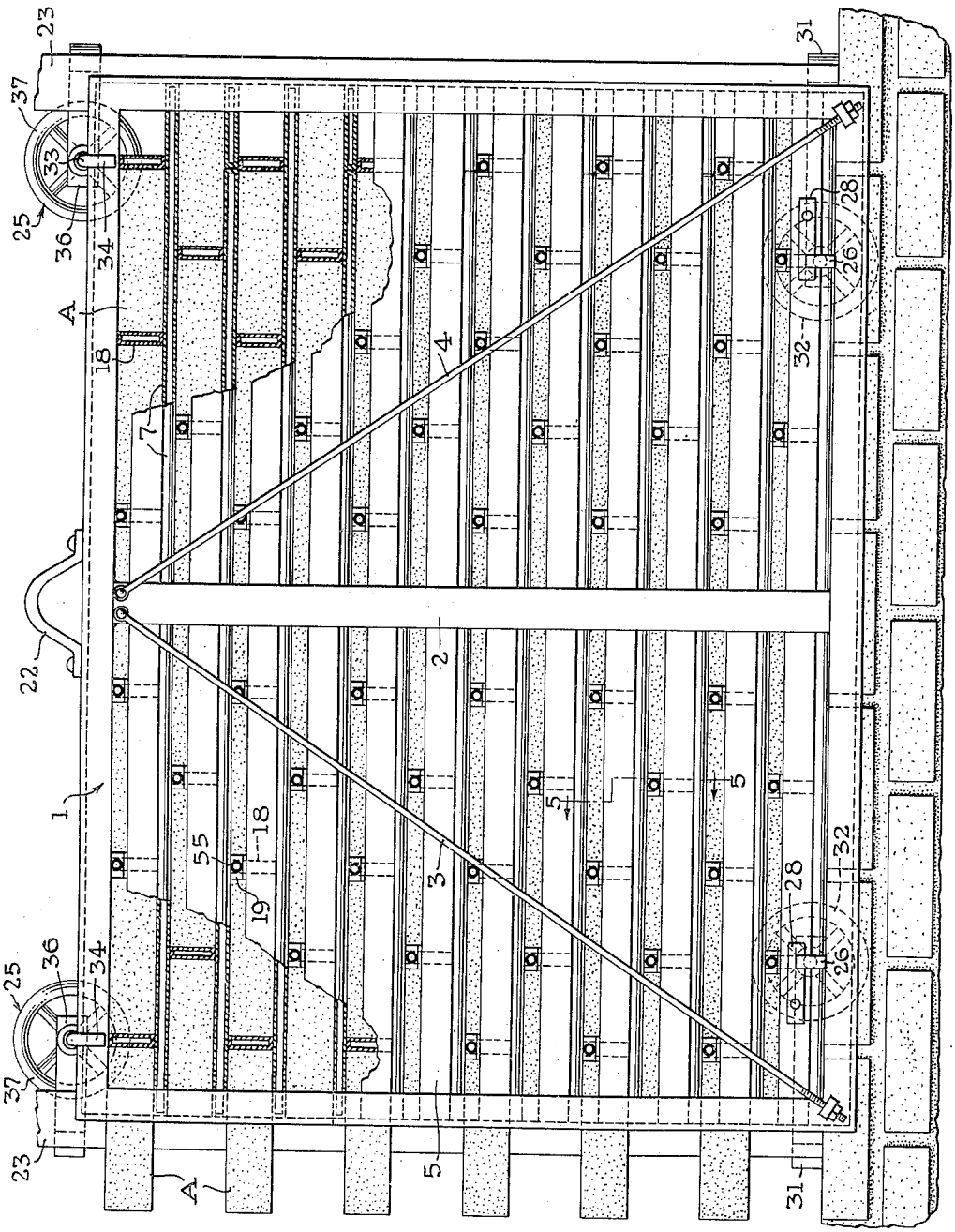


Fig. 1

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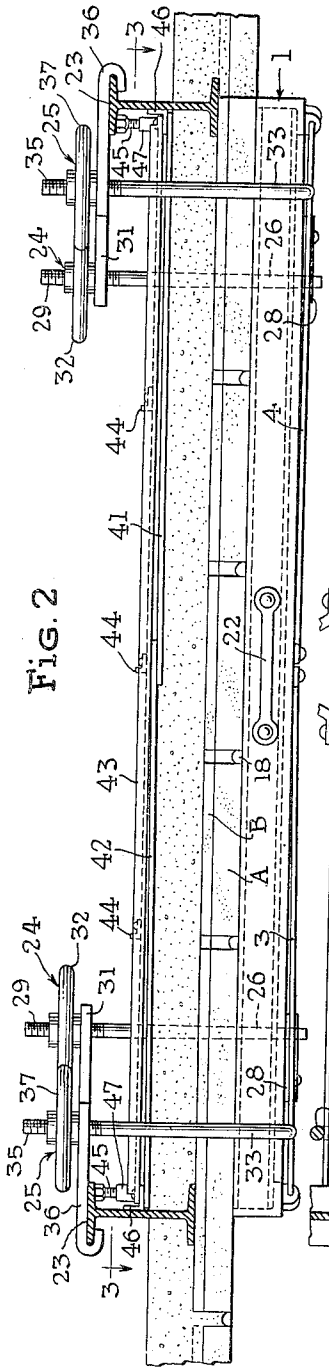


FIG. 2

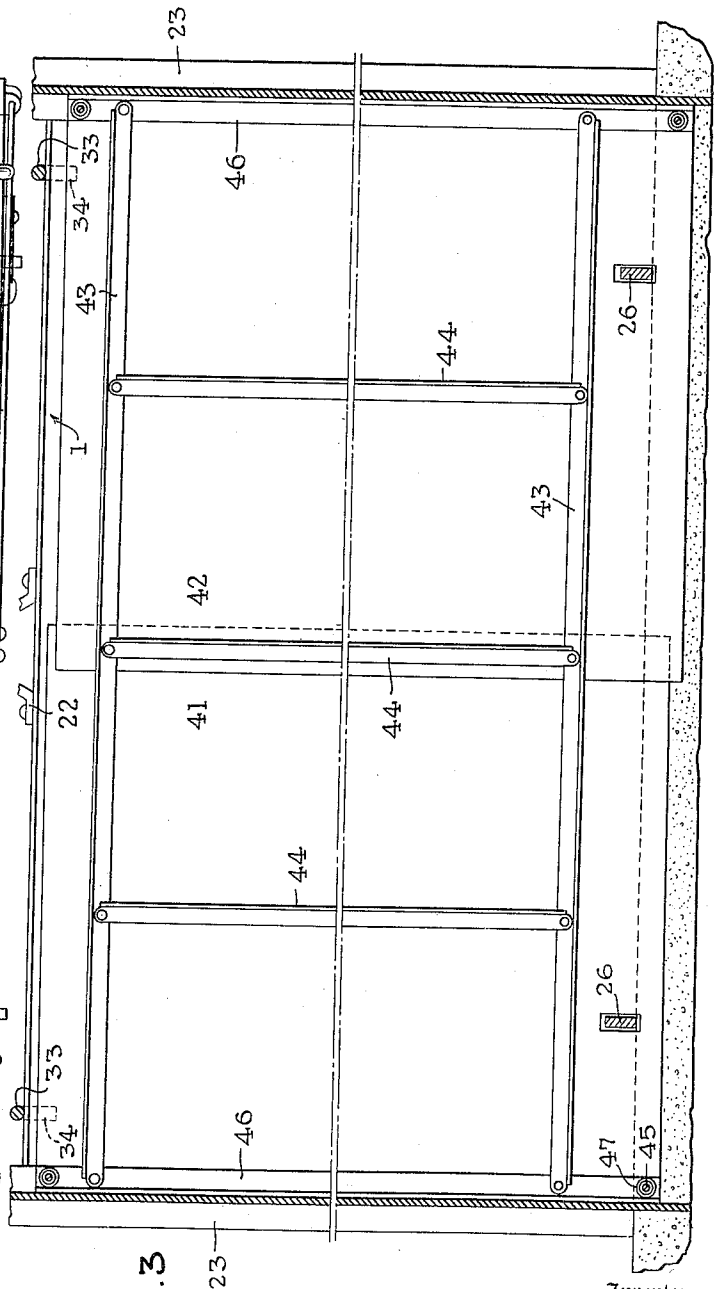


FIG. 3

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Fig. 4

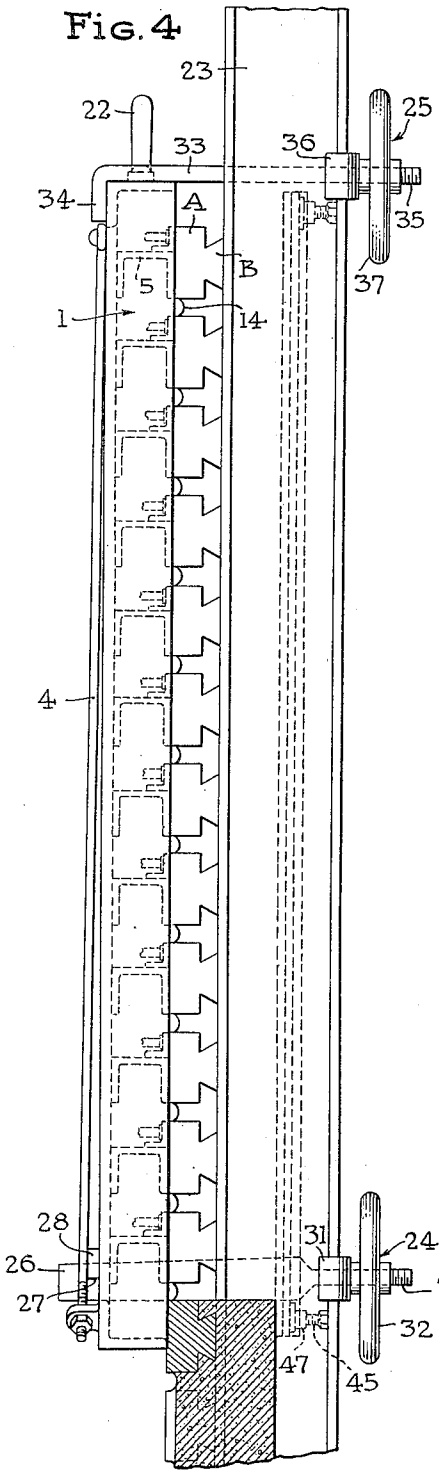


Fig. 5

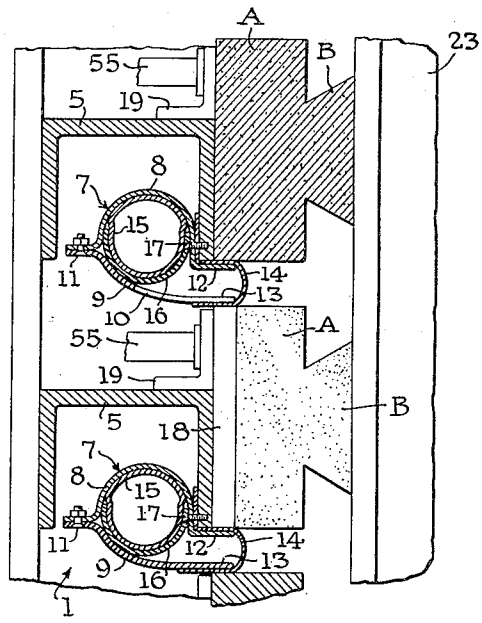


Fig. 6

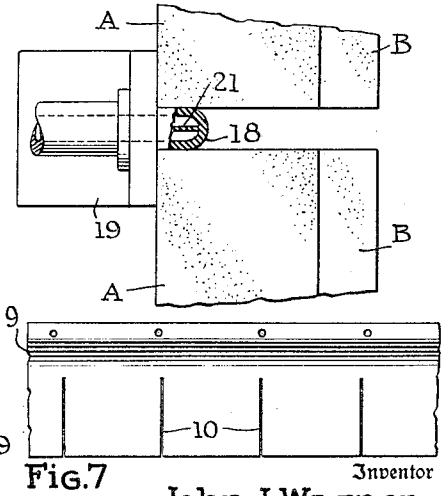


Fig. 7

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FORM FOR CONSTRUCTING TILE-FACED CONCRETE WALLS

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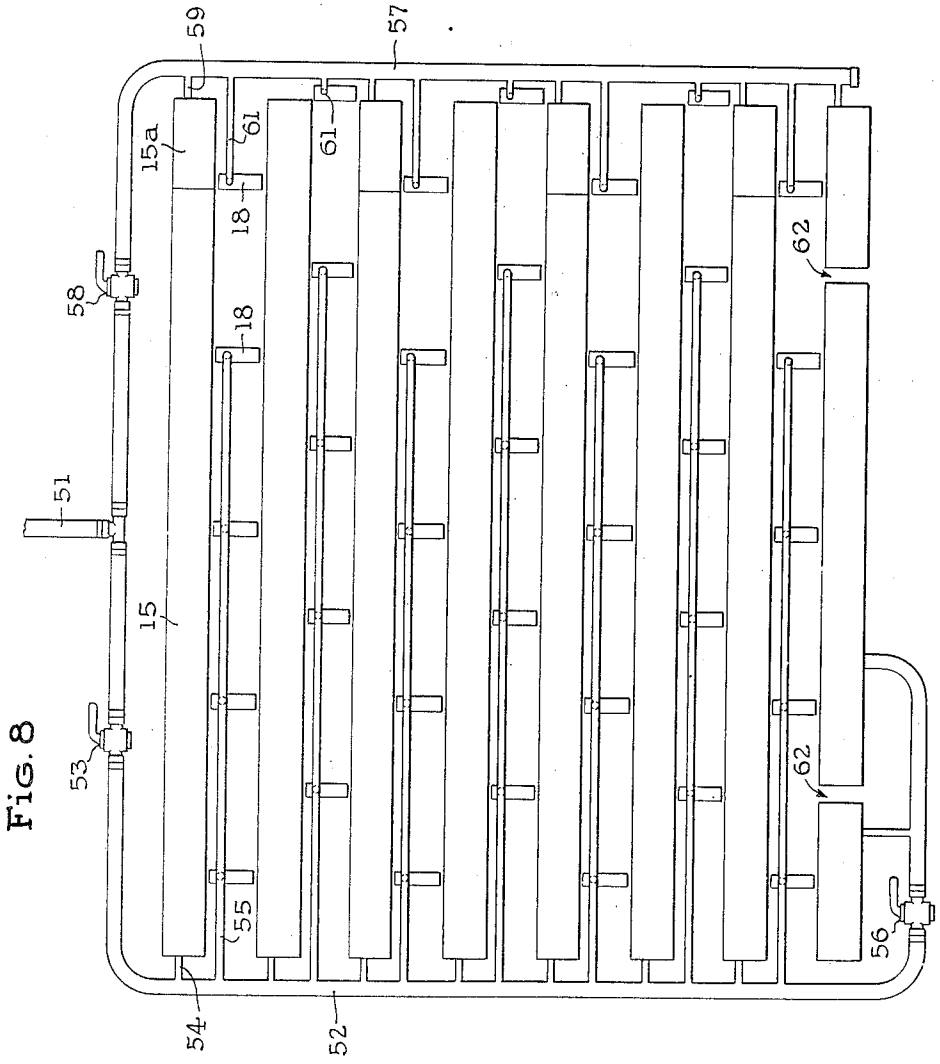


Fig. 8

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2,496,571

FORM FOR CONSTRUCTING TILE-FACED CONCRETE WALLS

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Application January 11, 1949, Serial No. 70,269

7 Claims. (Cl. 25—131)

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This invention relates to building construction, and provides a novel form for use in pouring a concrete wall having facing tiles so imbedded in its face as to approximate the appearance of a brick wall.

The embodiment chosen for illustration is intended for use in constructing a building having a steel frame in which there are vertical members of I or H section imbedded in the wall. This affords a convenient way of positioning the forms and is chosen as the illustrative example for that reason. However, the invention can be adapted to other types of construction by arranging appropriate supports.

The outer member of the form comprises a rectangular frame which can be attached to said vertical frame members and carries parallel horizontal bars equipped with clamps which hold courses of facing tiles. Each frame is loaded with tiles while in an inclined position, and after the tiles are properly spaced and clamped the frame with the tiles is hoisted to place and fastened in a vertical plane to the frame of the building. The rear member of the form is also sustained by the building frame, and in its preferred form comprises two steel plates linked together by parallel bars hinged at opposite ends to respective plates. The construction is such that the plates can be telescoped sufficiently to permit the rear form member to enter between flanges of two columns and then be expanded to fill the interval between the webs of said two columns.

In this way the flanges of the columns are availed of to sustain both members of the form, and as a consequence accurate positioning is easily and certainly attained. The rear form is made adjustable in position so that wall thickness can be determined according to the needs of the particular case.

The tile clamping means enter between successive courses of tile and spacers enter between the ends of successive tiles in the various courses, so that the joint-width is accurately determined, and so that the poured concrete is excluded from the front portion of the joint interval but not from the rear portion. As a consequence the final effect is precisely that of a raked mortar joint.

The clamps are fluid-pressure operated and the connections can be arranged so that most of the clamps are operated simultaneously. Preferably they are subdivided into groups in each of which simultaneous operation is afforded. This latter scheme is particularly useful when

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two or more forms are arranged end to end and their respective tile groups must intermesh.

The pressure fluid used to inflate and lock the clamps preferably is elastic so that after inflation and the closure of valves, the inflated tubes will remain under pressure even though the unit is detached from the source of pressure fluid. Compressed air is preferred, and the discussion of the exemplary embodiment will proceed on the assumption that compressed air is the pressure fluid used.

The tile may take various forms. While they could approximate the proportions of brick, relatively thin slabs are preferred, and keying ribs on their backs can be used to advantage. They may be of any shape engageable by long clamps arranged in a course and may be of any preferred material.

In simulating a brick wall the tiles can be arranged to give the appearance of Flemish bond, running bond (with or without rows of headers) or any other bond in which there are regular courses. For illustrative purposes plain running bond is adopted in the drawings. The term concrete signifies any suitable hydraulic cement with an appropriate aggregate.

A preferred embodiment arranged for use with a steel frame structure is shown in the drawings, in which

Fig. 1 is a front elevation of the front form charged with tiles and in place upon a previously poured section of tile faced wall. The fluid pressure connections and some parts are broken away to avoid confusion and expose details.

Fig. 2 is a plan view of one complete form in place.

Fig. 3 is a section on the line 3—3 of Fig. 2 showing the rear member of the form in elevation.

Fig. 4 is an elevation of the righthand end of the form shown in Figs. 1 and 2.

Fig. 5 is an enlarged section on the line 5—5 of Fig. 1 showing tiles engaged by the clamps and indicating the construction of the clamps.

Fig. 6 is a fragmentary view on a larger scale than Fig. 5, showing the spacer used between the proximate ends of successive tiles in one course.

Fig. 7 is a detail of a portion of one clamp strip.

Fig. 8 is a diagrammatic view of the clamps and the fluid pressure connections thereto, and indicates one manner in which the various groups of clamps may be successively inflated.

The main frame 1 is formed of angle iron welded or otherwise fabricated to form a rectangular marginal element. A vertical strap 2

and stay rods 3 and 4 give the main frame 1 added rigidity and assure that its rectangular shape will be maintained. Welded at their ends to the vertical elements of the main frame are parallel channel irons 5, which are horizontally disposed and continuous from one end to the other of the main frame. The channel irons 5 are mounted with their webs at the top and their flanges pendant, as best shown in Fig. 5, and they are preferably attached to strap 2. Each channel iron 5 supports and partially houses a clamping unit generally indicated by the reference numeral 7. Each such clamping unit extends from end to end of the channel which supports it, but the pneumatic distending means which sets the clamping unit are subdivided into two sections in clamping units for alternate courses, for a reason which will be explained.

Generally stated each clamp comprises a tube of metal, longitudinally split and having opposed out-turned approximately parallel flanges on the margins of the split. The flanges enter between the tiles of two successive courses to a depth less than the thickness of the tile and are the clamping members proper. To prevent concrete poured behind the tile from entering between the flanges, a flexible mortar flap is folded around the flanges and is attached to at least the upper one thereof. An inflatable rubber-like tube is enclosed in the metal tube and when inflated distends the tube, forcing the flanges apart. The tiles are placed by hand in the desired arrangement, so that they are supported in courses, each course being supported and alined by the upper flange of the corresponding clamping unit. Inflation of the tubes locks the clamps. The clamps through their inherent resiliency release the tiles upon deflation of the tubes and thus facilitate removal of the form from the finished wall.

Refer particularly to Fig. 5. A clamp assembly 7 comprises a relatively rigid semi-cylindrical section 8 and flexing spring section 9 flanged and bolted together at 11. The clamping flanges, so produced, are opposite one another, and comprise a right angled substantially rigid flange 12 formed on member 8 and extending beneath and beyond the supporting flange on channel 5, and a movable flange 13 beneath flange 12. Flange 13 is slotted or notched as indicated at 10, so that actually it comprises a series of semi-independent fingers.

The mortar flap, which may be rubberized fabric, appears at 14 and is clamped between member 8 and the flange of channel 5. It is folded smoothly around flanges 12 and 13 as shown, and may be attached to the flange 13. If attached to both flanges, slack for movement of flange 13 must be afforded. The inflatable tube 15 reacts between member 8 and a flexible semi-cylindrical retainer channel 16, preferably of thin spring metal. Channel 16 engages member 9. The assembly 7 is shown attached to the flange of channel 5 by screws 17 which pass through members 16, 8 and 14, and are threaded into the channel, but any preferred mode of attachment may be substituted. In Fig. 5 tiles are indicated at A and each is shown with a keying rib B on its back.

The tubes 14 are continuous in alternate courses. In the intervening courses they are constructed in two separately inflatable sections, the shorter of which, 15*a*, is approximately coextensive in length with one-half of a tile. This provides for intermeshing tiles of two adjacent forms prior to inflation of the short sections. Inflation of the short sections locks the intermeshed tiles. Consider the left edge of Fig. 1. The projecting tile ends could not be assembled with tiles in another form at the left if all the clamps at the edge of the other form were set. Hence, at the right edge of each form certain clamps can be set as an independent group after the two forms have been assembled. The connections which permit this will be described later.

Inserted into the vertical intervals between successive tiles in each course are rubber spacers 18, each sustained by an angle bracket 19 slidable along the web of the corresponding channel iron 5. They are inflatable by means described hereinafter and have (see Fig. 6) an internal stiffening web 21. The frame 1 is provided with a shackle 22 whereby it may be hoisted into position on top of the previously constructed foundation or a previously poured section of the wall. The frame 1 is fastened in place against the vertical frame members 23 by means of lower clamps 24 and upper clamps 25. Clamps 24 comprise a wall piercing, tapered member 26, having a notch 27. A latch bar 28 is hinged on the frame 1 and engages the notch in the member 26. The member 26 has a threaded portion 29. Slidable on this portion is a hook-like clip 31 which engages the frame member 23 as shown in Figs. 2 and 4. A combined hand wheel and nut 32 serves to tighten the clamp 24. At the top of the frame are located similar clamps 25. The clamps 25 comprise a rod 33 having a hooked portion 34 and a threaded portion 35. Slidable on the threaded portion is hook-like clip 36 which engages a frame member 23. The clamps 25 are actuated by a combined hand wheel and nut 37.

Spaced from the main frame 1 is a rear form member made up of two overlapping flat plates of metal 41 and 42. Each has an angle iron stiffener 46 along its outer margin, as shown in Fig. 3. These plates are connected together by parallel angle iron links 43. Transverse members 44 are hinged at intervals to the links 43 and assist in maintaining those members in a parallel relation, so that the margins of the sheets 41 and 42 are kept parallel.

The links guide the plates so that the horizontal dimension between the stiffened edges 46 can be reduced sufficiently for the form to clear the flanges of adjacent frame members 23. When expanded to normal dimensions the interval between the webs of frame members 23 is spanned (see Figs. 2 and 3), and the members 43 and 44 function to support the plates.

Thrust screws 45 in bosses 47 serve as means to engage the inner flanges of frame members 23 and adjust the position of the rear form member.

Figure 8 is a diagram of the fluid pressure connections which can be made most conveniently by flexible hose though the manifolds are usually rigid pipes.

The main air supply line 51 receives compressed air at suitable pressure, say 75 p. s. i. from any suitable source, not shown. This supplies a main manifold 52 through a manually operable stop valve 53 and this manifold is connected by branches 54 at all times to all the main clamp-operating tubes 15 except the lowermost one thereof, and also by branches 55 to all the spacers 18 except the last one to the right in each course. The lowermost one of tubes 15 is connected to

the manifold **52** through a manually operable stop valve **56**.

A secondary manifold **57** is supplied with compressed air through a manually operable stop valve **58** and is connected by branches **59** with the short inflatable tubes **15***a*, and by branches **61** with the spacers last to the right in each course.

The reason for using valve **56** is the fact that the lowermost clamp does not function when the frame is initially charged with tile. After the form is set in place this clamp is actuated to seal the joint at the bottom of the form to the foundation or to a previously poured wall section, as the case may be.

The intervals at **62** are for the passage of clamp members **26**.

Operation

The frame **1** is laid in an inclined position with the clamping flanges **12** and **13** up and both manifolds **52** and **57** vented to atmosphere. Tiles **A** are then arranged between the clamping flanges with the spacers **18** interposed.

With valves **56** and **58** closed and valve **53** open, supply line **51** is put under pressure, inflating tubes **15** and spacers **18** connected to manifold **52**. Valve **53** may then be closed. The tiles are now locked and properly spaced.

The rear form **41**, **42** is set in place and frame **1** is hoisted to position. Clamps **24** and **25** are set to fix the frame **1** to the frame members **23**. If another frame such as **1** is already in place the tiles (which are staggered as shown to give the running bond pattern) must be intermeshed, whereupon valve **58** should be opened and closed to inflate tubes **15***a* and complete the clamping of the end tiles so intermeshed.

At or about the same time valves **56** and **53** are opened and closed, so as to inflate the lowermost tube **15**, producing a seal to the underlying wall or foundation. Supply line **51** may then be disconnected from the source of air.

Concrete can now be poured. After it has set, valves **53**, **56** and **58** are opened to vent the connected manifolds. Clamps **24** and **25** are released and removed and the frame **1** and back form are removed, leaving the tile-faced wall. The members **26** are withdrawn. Since they are so located as to pass through the interval between the ends of two tiles the aperture can be pointed up and becomes a part of a simulated mortar joint.

Obviously, special frames embodying the principle characteristic of frame **1** and its related parts can be built to meet requirements imposed by door and window openings, corners and similar details, but the embodiment illustrated discloses the principles of the invention, which obviously are adaptable to special applications of the invention, such as will be encountered in commercial practice of the invention.

In the foregoing description and in the claims, the word "inflate" and its derivatives are used in its generic sense, meaning to swell or distend without implied limitation to any particular pressure fluid.

What is claimed is:

1. A structure for sustaining one face of a poured concrete body and for positioning tile-like members to be incorporated in said face, said structure comprising, a sustaining frame; a series of spaced, parallel supporting members on said frame; clamps sustained by respective supporting members and extending substantially the entire length thereof, each clamp comprising a split, expansive metallic tube having clamping flanges extending along the opposite margins of said split, and inflatable expanders within the tube and serving upon inflation to expand the tube and so force the clamping flanges thereof apart, the flanges of pairs of adjacent tubes being spaced to receive between them courses of facing tile-like members; means for masking the interval between the two flanges of the clamp whereby the entrance of concrete into the clamp is inhibited; means for holding said frame in position as a part of a mold structure; and means for inflating said expanders.

2. The combination defined in claim 1 in which the inflatable expanders of certain of the clamps are subdivided into a main unit and a short complementary end unit, said end units being capable of inflation independently after the main units have been inflated.

3. The combination defined in claim 1 in which the clamp-masking means is a flexible apron attached to at least one of said flanges and drawn around the edges of both.

4. The combination defined in claim 1 in which the upper flange of each clamp is rigid, and the opposed lower clamp is of elastic metal in the form of a series of fingers which may be flexed each independently of the others.

5. A structure for sustaining one face of a poured concrete body and for positioning tile-like members to be incorporated in said face, said structure comprising, a sustaining frame; a series of spaced, parallel supporting members on said frame; clamps sustained by respective supporting members and extending substantially the entire length thereof, each clamp comprising a split, expansive metallic tube having clamping flanges extending along the opposite margins of said split, and inflatable expanders within the tube and serving upon inflation to expand the tube and so force the clamping flanges thereof apart, the flanges of pairs of adjacent tubes being spaced to receive between them courses of facing tile-like members; inflatable spacers interposed in the intervals between proximate ends of successive tile-like members in the various courses; means for holding said frame in position as part of a mold structure; and means for inflating said expanders and said spacers.

6. The combination defined in claim 5 in which the inflatable expanders of certain of the clamps are subdivided into a main unit and a short complementary end unit; and separate inflating connections are provided for the main units, and for the end units.

7. The combination defined in claim 5, in which the inflatable expanders of certain of the clamps are subdivided into a main unit and a short complementary end unit; separate inflating connections are provided for the main units and for the end units, and one flange of the pair forming part of each clamp is slotted to afford semi-independent fingers.

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No references cited.