July 14, 1942. R. W. THOMPSON 2,289,558

BUILDING CONSTRUCTION

Filed Jan. 5, 1940 2 Sheets-Sheet 1

Fig. 1.

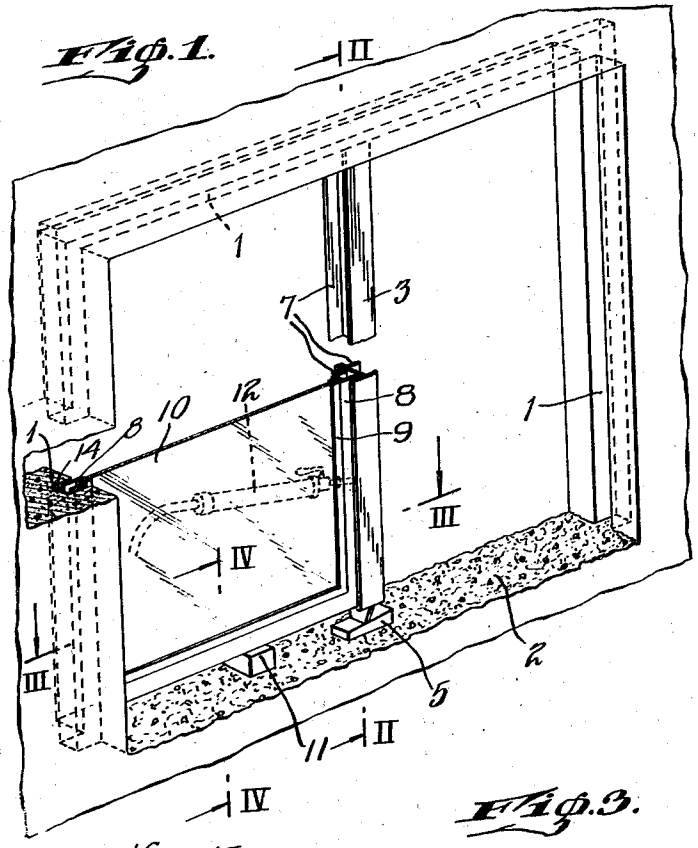


Fig. 2.

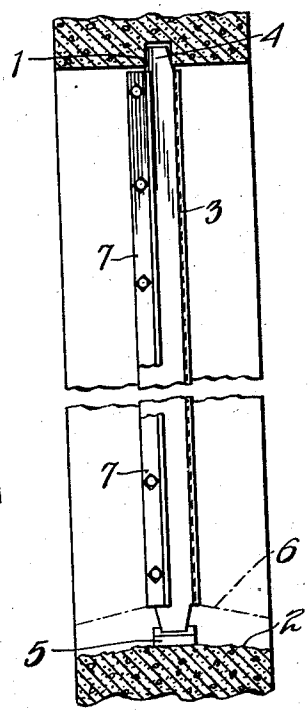


Fig. 3.

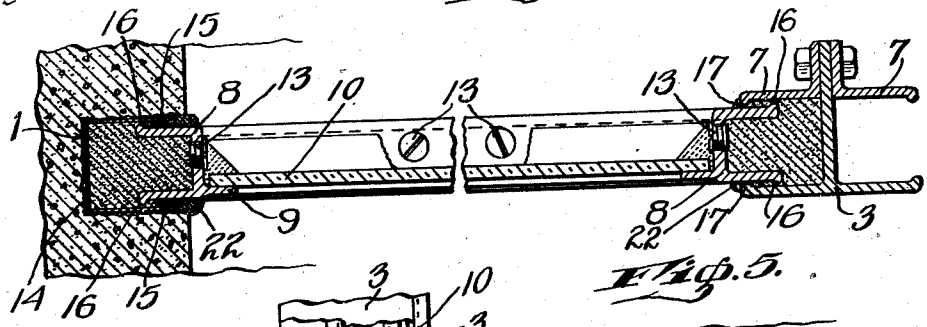


Fig. 4.

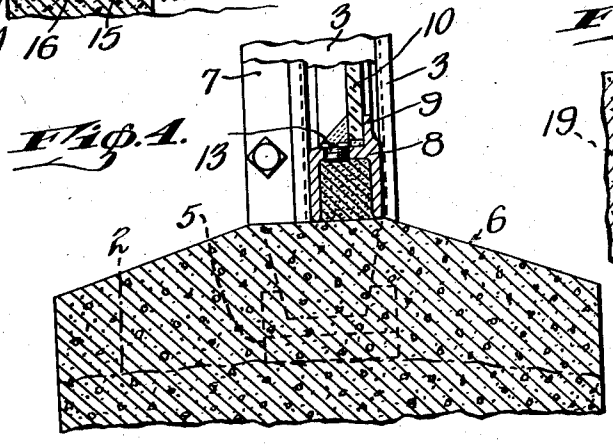
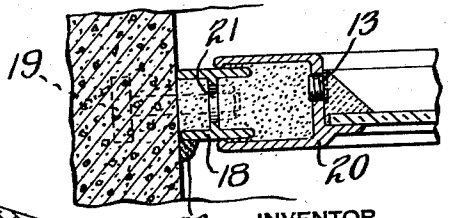


Fig. 5.



INVENTOR
Robert W. Thompson
BY
Jeffery, Kimball & Eggleston
his ATTORNEYS

July 14, 1942. R. W. THOMPSON 2,289,558

BUILDING CONSTRUCTION

Filed Jan. 5, 1940 2 Sheets-Sheet 2

Fig. 6.

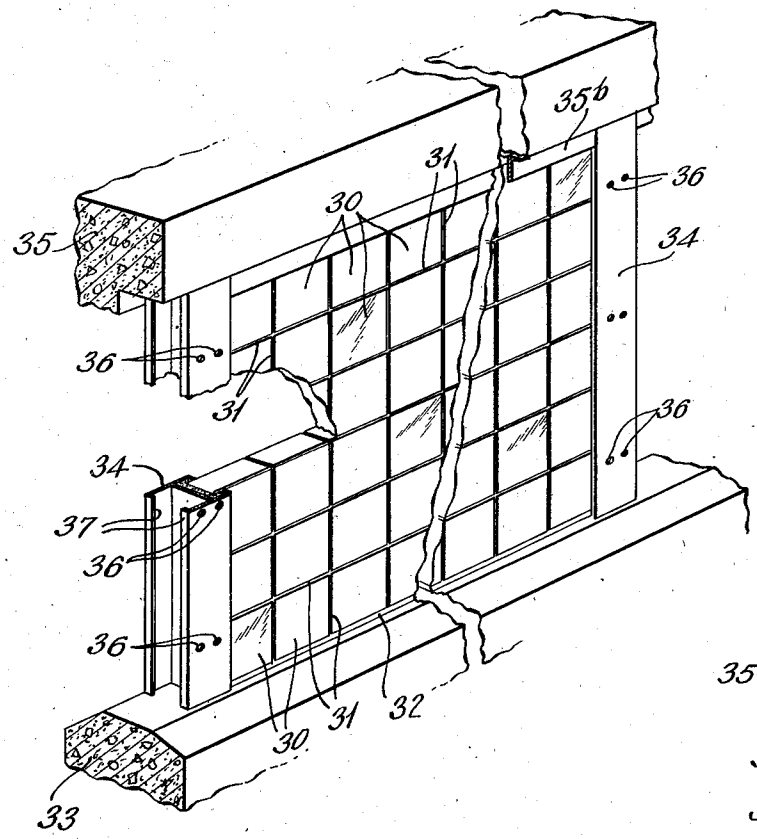


Fig. 7.

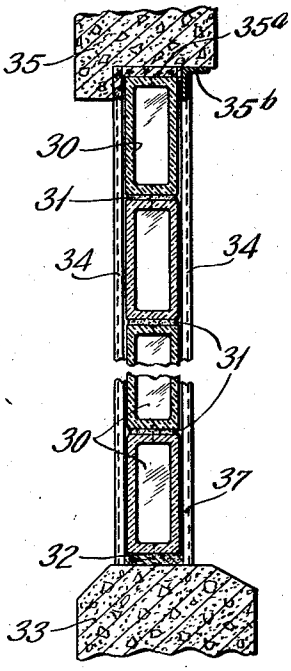
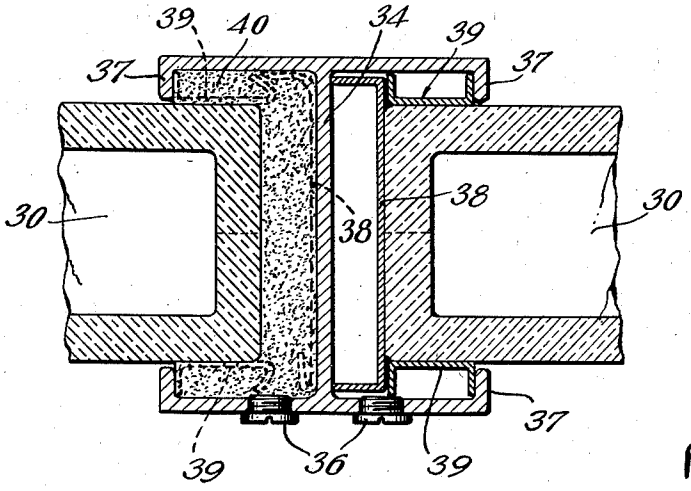


Fig. 8.



INVENTOR
Robert W. Thompson
BY
Jeffery, Kimball & Eggleston
his ATTORNEYS

Patented July 14, 1942 2,289,558

UNITED STATES PATENT OFFICE

2,289,558

BUILDING CONSTRUCTION

Robert W. Thompson, Flushing, N. Y.

Application January 5, 1940, Serial No. 312,481

9 Claims. (Cl. 72—98)

The invention relates to building wall construction and among its objects includes the reduction and practical elimination of metal corrosion at the junction between the window frames and like elements and the walls in which they are installed and the avoidance of distorting strain in such frames or in other building wall elements, occurring from thermal or other causes, all as hereinafter sufficiently made apparent.

The principle of the new construction is illustrated in the accompanying drawings, wherein

Fig. 1 is a broken-out perspective of a masonry wall with a building element in the form of a window frame installed, as viewed from the outside of the building;

Fig. 2 is a vertical section, broken out, of Fig. 1 on line II—II;

Fig. 3 is a horizontal section on line III—III of Fig. 1;

Fig. 4 is a section of the sill of Fig. 1 on line IV—IV;

Fig. 5 a horizontal section of a modification;

Fig. 6 represents the mounting of a glass-block wall element according to this invention;

Fig. 7 being a vertical section, and

Fig. 8 a horizontal enlarged section.

Referring first to Fig. 1, the building wall shown may be assumed to be made of poured concrete but may be of any other kind of construction. The opening therein is shown as a window opening for a double window but it might accommodate a single, or three or more windows, or a door or other building element required to be permanently fixed in the wall and wherein durability against either strain or corrosion is of primary importance.

Regarding it as a window opening, the jamb and lintel faces of the opening in the wall shown are initially cast or otherwise provided with means to hold a metal window frame therein, and in the preferred form such means is constituted of cast channels, such as indicated at **1**. The sill or bottom side of the opening is left rough and unfinished, as indicated at **2**, until the metal window frame has been put in place.

In the case of the double window taken for illustration, the masonry wall opening is divided by a mullion **3** which is formed of a metal T-section, with its flat head exposed to the outside of the building. It is first cut or beveled at its top as indicated at **4**, and then inserted into the lintel channel of the opening and its lower end is preliminarily blocked up by a plug, such as **5**, placed between it and the unfinished sill **2**. It will be understood that one or more mullions are used in case of multiple windows, and that when the rough sill is finished up to the contour line **6** (Fig. 2) they become permanent parts of the wall structure.

Two angle-section rails **7** are bolted along the edge of the web of the T-section mullion, one on each side so as to form, with the head of the T, a channel on each side of the mullion of the same width as the cast channels **1** previously formed in the masonry and in the same vertical plane.

The frame bars **8** of the metal window frame are of appropriate size to enter into and be held by these channels in the masonry and in the mullion, and while they may be of any desired section, they are preferably of hollow or U-section, with their open sides faced toward the channels and each bar is formed with an appropriate ledge or flange or other interior construction, upon which the glass pane **10** may be glazed in the usual way or to which any sash, sub-frame, door, or the like may be engaged as when the window is of the openable type.

This frame is introduced into the wall channels either by removing an angle rail **7** from the mullion web, or else by making one of the jamb channels so deep that one edge of the frame can be entered far enough into it to allow the opposite edge to enter into its channel, after which the frame is centered in the opening and then pushed upwards until the top bar enters into the lintel channel. The latter method of insertion is necessarily employed in the case of a single window, where all of the channels are cast in the masonry; it is also convenient when one of the channels is formed by a mullion.

In either case the jamb channels are deep enough so that their bottoms or inner faces are spaced apart slightly more than the width of the frame and so that the latter can be centered to a mid-position in the opening and temporarily blocked-up from the rough-finished sill by a block such as indicated at **11**. In such position the periphery of the window frame will be out of bearing contact with the bottoms or inner surfaces of the side and lintel channels.

While thus supported, the rough sill is finished up to the final contour **6** (Fig. 2) which permanently confines the frame and the mullion in the wall.

The final step of the installation is then to inject a plastic composition into the hollows of the several frame bars and channels so that it surrounds the periphery of the frame. Such composition may be ordinary caulking compound

composed of tung oil, asbestos, clay and gum, or some other non-drying or slow-drying plastic which exhibits some compressibility or resilience and to which is preferably added a portion of ground cork up to say, 25% by volume, to increase its resilience and make a permanent cushion. On account of its viscous, sticky nature it requires to be injected under pressure, say of about 30 lbs. and this is done by a force gun (dotted lines 12 in Fig. 1) screwed or coupled successively into filling holes in the frame bars, which are later closed by plugs 13, Fig. 3.

The injection of plastic is carried to such extent that the hollow frame bars and the channels in which they are held, and all of the spaces between the bars and the channel bottoms, become completely filled and the plastic begins to appear squeezing out from the cracks between the frame and the channels, as well as between the bottom frame bar and the masonry sill. The frame may be temporarily immobilized in its centered position, if desired, to guard against displacement by the pressure effect during injection, though precaution is not ordinarily necessary.

By the above means, the whole frame, besides being confined in place in the channels, becomes additionally seated or bedded in plastic around its margins, and this condition serves two important purposes. First, the plastic forms or becomes a somewhat mobile cushion between the wall and the metal frame, saving the latter from such distorting strains as may occur from thermal or other dimensional changes in the lapse of time, and, second, it excludes all air from the junction between the metal frame and its surrounding support, thereby specially enhancing the structural durability, because air in these interior spaces contains and acquires water vapor by a breathing process and such moisture in the course of time leads to certain corrosion proceeding from inside the junction.

Heretofore it has been customary to guard against metal corrosion at the junction simply by caulking the seams or corners between the weather face of the metal and the masonry, but this protection while desirable and in common use is, in fact, no more than a retardant when there are interior air spaces, because it does not prevent corrosion emanating from the moisture of the air in the interior of the junction. When all of the internal spaces have been filled in solid with the composition corrosion is inhibited, but the external caulking just referred to can be additionally applied if desired as indicated at 22 in Figs. 3 and 5, though it is not necessary, and paint alone can be relied on for preservation of the metal.

Inasmuch as channels formed in masonry tend to be wider than necessary and often irregular I have found it desirable to line them with a sheathing, such as indicated at 14 in Fig. 3, of thin sheet copper or roofing felt. This is inexpensively produced and is readily slipped into the channel. It has inturned margins or lips 15 which make contact with the sides of the frame bars 8 when the frame is introduced and act as a packing to confine the plastic against too easy escape under the force-gun pressure. Consequently, the sheathing aids the distribution of the filling lengthwise of the channels and frame bars. At the same time the pressure of the plastic expands the sheathing pressing it firmly against the walls of the channel making a tight connection. When roofing felt is used it adds to the cushion effect and may be used in the metal channels as well as the others.

It is found that any metal-to-metal contact exposed to the elements is subject to corrosion and on this account I form the margins of the frame bars 8 with outwardly projecting beads or ribs, such as indicated at 16, and form similar but inwardly projecting ribs 17 on the edges of the mullion flanges so that, to the extent that the metal of the frame bars touches the metal of the mullion, after the plastic has been introduced, the area of the contact is limited to no more than the line contact of the beads and thereby the effect of corrosion is rendered insignificant. At the same time the escape of the injected plastic is restrained.

Fig. 5 illustrates the application of the invention to the case where a masonry opening has been finished with flat jamb and lintel faces, with no frame-receiving channels. In this case the means for holding the frame in the opening is constituted of a rail 18 of hollow section, preferably H-shaped, bolted to the jamb face. The bolts 19, such as indicated in dotted lines, are or may be cast in the masonry, or they may be expansion bolts. The window frame 20 in this form has the same U-section frame bars as in the first example, but they are adapted in this case to telescope over the rail 18 as well as over a similar rail formation (not shown) which can be provided on or by the mullion, in the case of multiple windows. The U-section of the frame bars is made of sufficient channel depth to allow the sides of the frame to be fitted first on one rail and then on the opposite rail, being thereafter blocked-up in centered position as before, while the finished sill is being installed.

The force-gun is then applied to the openings in this frame, as in the other, to charge the filling material into all the interior spaces, under pressure as before, the web of the H-bar being perforated at intervals as indicated at 21, and the charging process being continued until the plastic material shows coming out from the crevice between the H-bar rail and the masonry and also from beneath the bottom bar, thus indicating that all of the interior spaces have been filled to the exclusion of air and so as to form the injected cushion. Aside from the substitution of a rail for the channel, the construction and mode of installation as well as the advantages thereof will be seen to be generally the same as first described.

Even where the prevention of corrosion is not of primary importance, the installing of the frame or element by the process of injecting a plastic medium into the space between its boundary and the surrounding building structure affords many practical advantages over present practice since it provides a simple and economic means of interposing a permanently yielding yet water-proof and air-tight cushion between the element and the structure, and this invention contemplates the use of this cushion-injecting process for all such purposes.

As exhibited by Figs. 6–10 the building element is a panel composed of hollow glass blocks 30 cemented together by mortar 31 like building bricks. This panel is supported on a strip of asphalt impregnated felt 32, or the like, on a sill member indicated at 33 and is formed by laying the blocks in successive courses with the edges of the end blocks of each course confined between the flanges of vertical frame members 34 which are shown as of metal but might be

otherwise. The dimensions are predetermined so that the blocks penetrate only partly into the channels, that is, do not contact the webs thereof.

When the courses have been laid up to the top beam or lintel **35**, thus forming the panel, the top course is covered by a strip of cork **35a** and secured in place by an angle **35b** and then the plastic cushioning material above referred to is injected under pressure into the spaces between the vertical margins of the glass panel structure and the webs of the channels so as to form a moisture-proof cushion therein and which may if desired be injected also along the top of the panel. For this purpose the flanges of the metal frame members are appropriately apertured (**36**) at intervals to receive the force gun, which injects the plastic.

The margins of the flanges of the frame members are desirably provided with return-bent lips **37** or equivalent means for obstructing excessive escape of the plastic as these points. Sheathing of roofing felt, with inturned lips, as in Fig. 1, could be used in their place, if desired. However, it is important to guard against the entry of any of the mortar, used in setting up the blocks, into the space within the channels, where, on setting, it would constitute unyielding obstruction to the thermal expansion of the panel and result in its possible fracture. On this account the invention includes the use of hollow forms of cardboard or roofing felt folded or creased so as to occupy these spaces during the period that mortar is being used, and so as to prevent any of it from falling into the channels. When such forms are used they help, and can even be used in substitution for, the lips **37** in the plastic-retaining function of the latter.

As shown at the right of Fig. 8, these forms can comprise a center form **38** of shallow channel section placed against the web of the frame member and two similar but narrower side sections **39** placed against the flanges. They are located before the block courses are laid up and are therefore effective for the purpose of excluding mortar besides affording a temporary support for guiding the blocks to exact vertical alignment as they are built up. Being of pliable or yielding material the forms collapse, probably to something of the condition indicated at the left of Fig. 8, when the plastic (marked **40**) is forced into the spaces they occupy, or with care they could be pulled out when they had served their purpose, but it will be apparent that when left in place as indicated they supplement the return-bent lips **37** in closing or restricting escape of plastic.

It will be observed that in this as in the other examples, the margins of the building element form part of a channel space which is virtually a closed chamber extending along the edge or periphery of the element and from which the only outlet is such as is afforded at the crevice at the lips or sides of the channel. This permits escape of the air when the plastic is injected, and under the pressure of the force gun may also allow a fin of plastic to squeeze out, but under normal conditions it retains the plastic from escaping, and it may be noted also, as an incident to the structure disclosed, that the plastic is concealed in the chamber and well protected against the elements, particularly air and light both of which are deleterious, and in consequence of which the plastic retains its life and mobile character much longer than could be realized if any substantial surface of it were exposed to the exterior.

I claim:

1. The method of installing metal window frames in masonry wall openings which comprises forming said opening with means to hold the top and sides of the frame, engaging the top and sides of the frame with said means before the sill of the opening is finished, then finishing the sill and finally forcing an air-excluding plastic compound into all the space enclosed between said frame and the masonry surfaces.

2. The method of installing glass block panels in building wall openings which comprises building the blocks with mortar into a panel with its margin confined but not fully seated in a vertical channel, closing the side spaces between the panel and channel and thereafter injecting a plastic yielding compound under pressure into and filling the space between said panel and the channel bottom.

3. The method of the preceding claim in which hollow or collapsible forms are used to occupy the channels during the building of the panel to exclude mortar therefrom and close said side spaces.

4. Building wall construction comprising a wall opening, a building element therein with its margin on each side occupying a channel appurtenant to said opening, and with said channel forming a chamber extending between the edge of the element and the channel bottom, said chamber being provided with one or more injection holes, packing means for closing the junction between said element and channels to adapt the chamber to resist escape of plastic material injected therein, and a plastic cushioning compound injected into and confined in the chambers along opposite margins of said element.

5. Building wall construction comprising a masonry wall opening, a building element therein comprising frame bars of outwardly facing channel section, each such bar being correlated with the masonry of said opening to form a chamber extending along the periphery of said element between the channel bottom and masonry, which chamber is sufficiently closed to resist any substantial escape of plastic material forced into said chamber, and an injected plastic resilient cushioning composition filling said chamber to the exclusion of air.

6. Building wall construction comprising a masonry wall opening with a channel cast therein, a building element comprising a frame bar of outwardly facing channel section telescoping with the masonry channel and therewith forming a chamber extending along the junction of said wall and element, which chamber is sufficiently closed to resist escape of plastic material forced into it and having one or more injection holes adapted to take a force-gun and a plastic resilient cushioning compound injected through said holes and filling said chamber.

7. Building wall construction comprising a wall element formed of built-up glass blocks having its vertical margin confined in a channel in the building wall and forming a chamber between the edge of the element and the channel bottom, said chamber having one or more injection holes, packing means for closing the space between the front and back faces of the element and the sides of the channel to adapt the chamber to resist escape of plastic material forced into it and a plastic cushioning compound injected through said holes and confined in said chamber.

8. The method of preventing corrosion of metal window and like frames at their junction with masonry walls to which they are fitted, which

comprises mutually configuring the masonry and the metallic margins of the window frame so that when the latter is placed in the opening of the wall all of the space between the metal and the masonry constitutes a chamber extending around the periphery of the window frame, substantially closing the space between said metal margins and the masonry and then driving out the air from said chamber by forcing a plastic asphalt-like compound into such chamber under pressure, and confining such compound permanently therein.

9. Building wall construction comprising in combination with a wall opening, a building element in such opening, the margins of such element and the proximate parts of the wall opening comprising a channel and means cooperating with the walls of said channel to form a closed chamber extending along the periphery of the element, which chamber is sufficiently closed to resist any substantial escape of plastic material forced into said chamber, there being one or more injection holes in the wall of such chamber adapted to take a force gun and such chamber being filled to the exclusion of air with a plastic resilient material injected under pressure through said hole or holes.

ROBERT W. THOMPSON.