April 5, 1955 E. G. LIVESAY 2,705,415

WINDOW FRAMES

Filed March 14, 1951

4 Sheets-Sheet 1

FIG. 1.

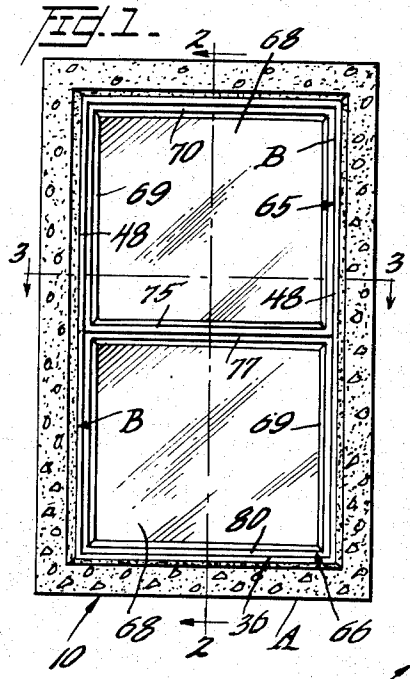


FIG. 2.

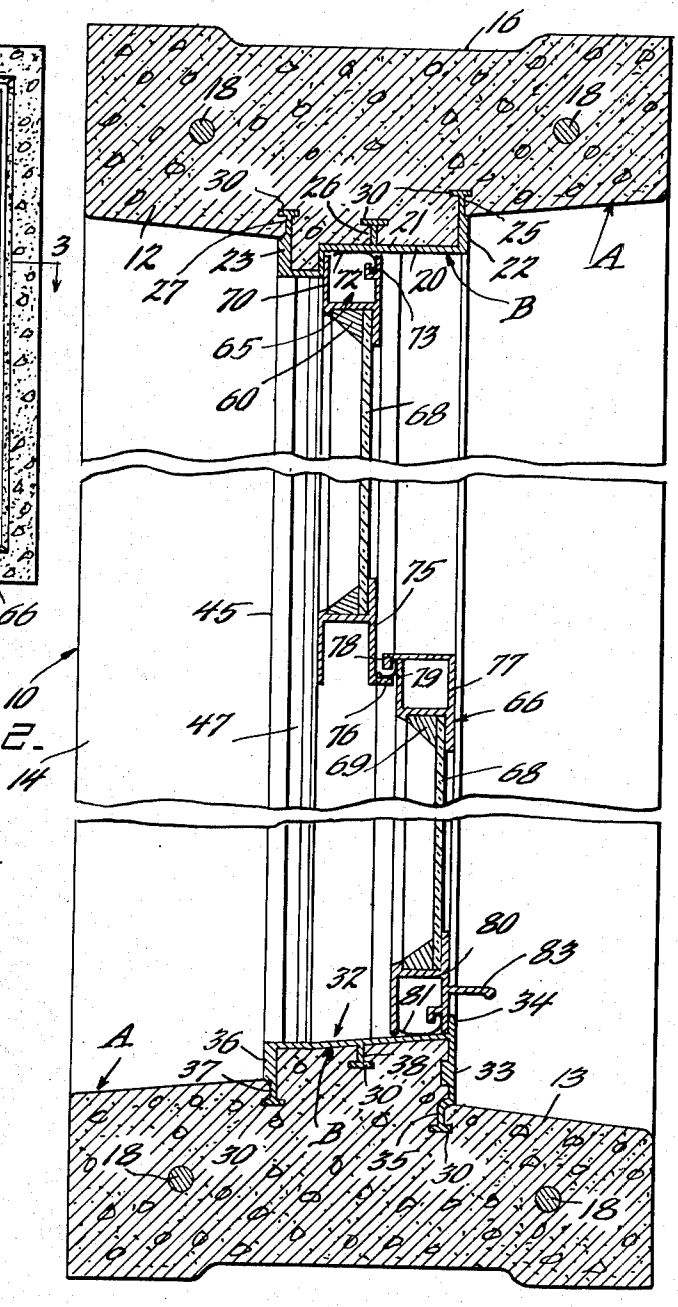
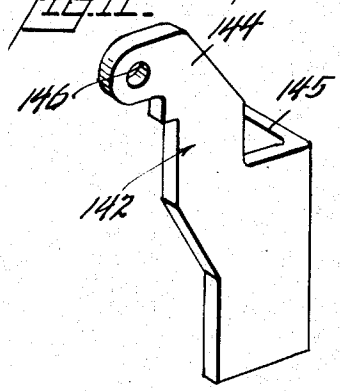


FIG. 11.



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4 Sheets-Sheet 2

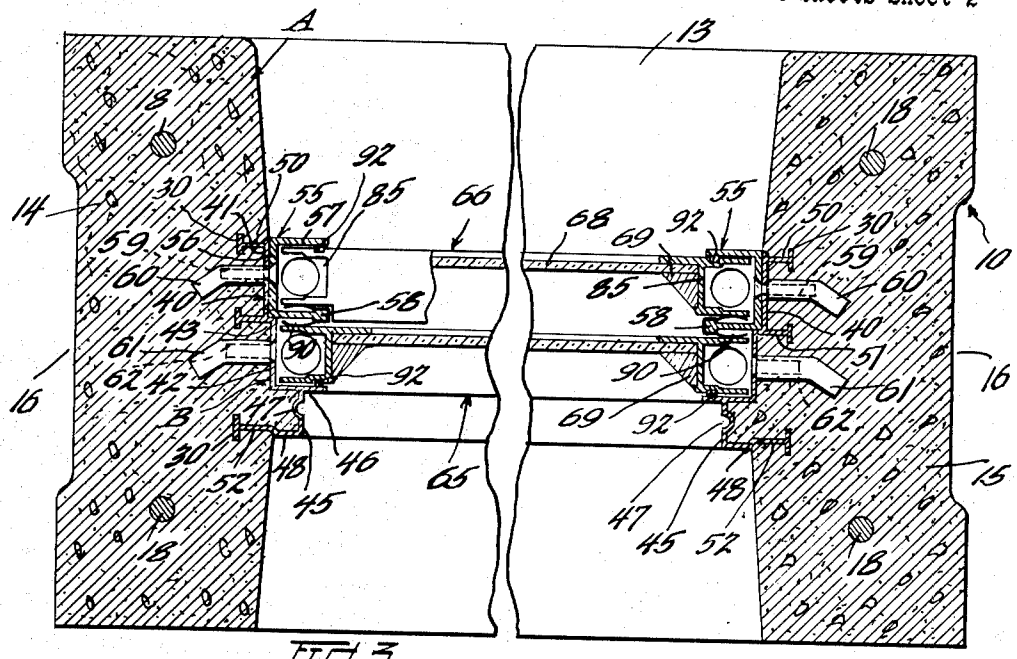


FIG. 3.

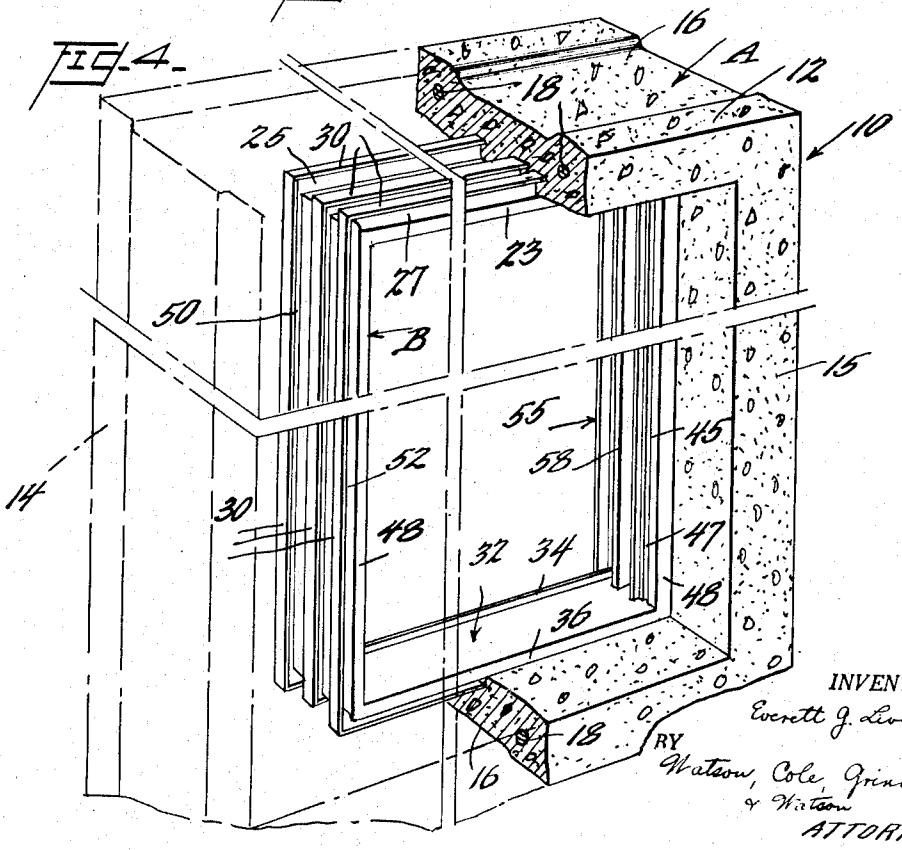


FIG. 4.

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WINDOW FRAMES

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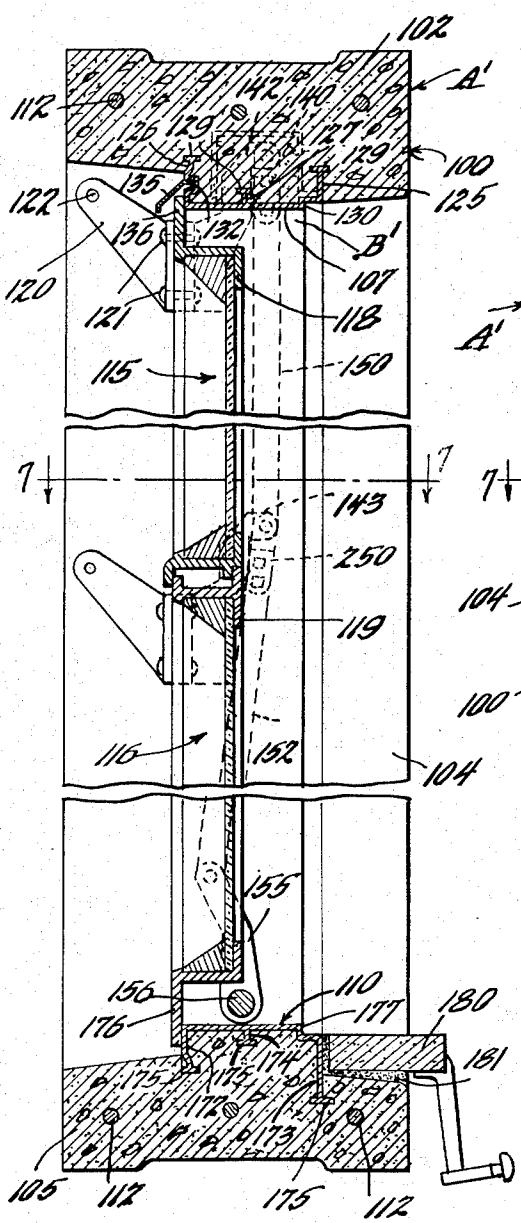


FIG. 6.

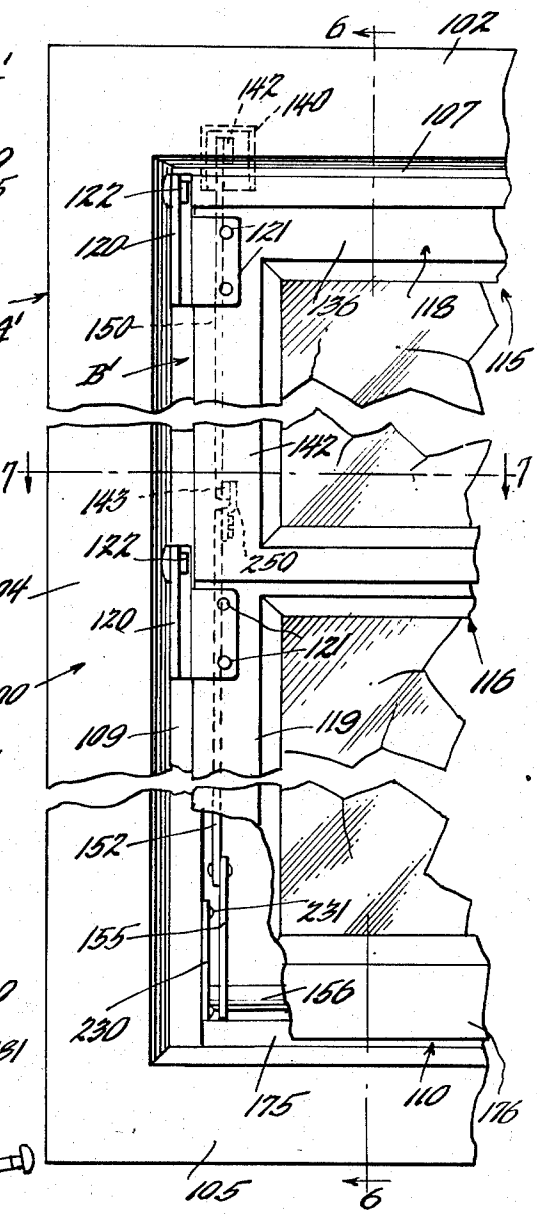


FIG. 5.

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WINDOW FRAMES

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FIG. 7.

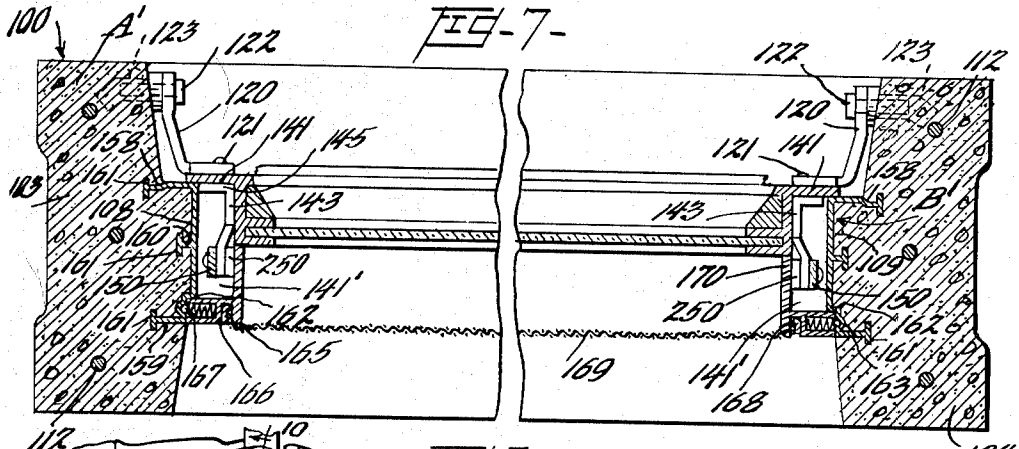


FIG. 8.

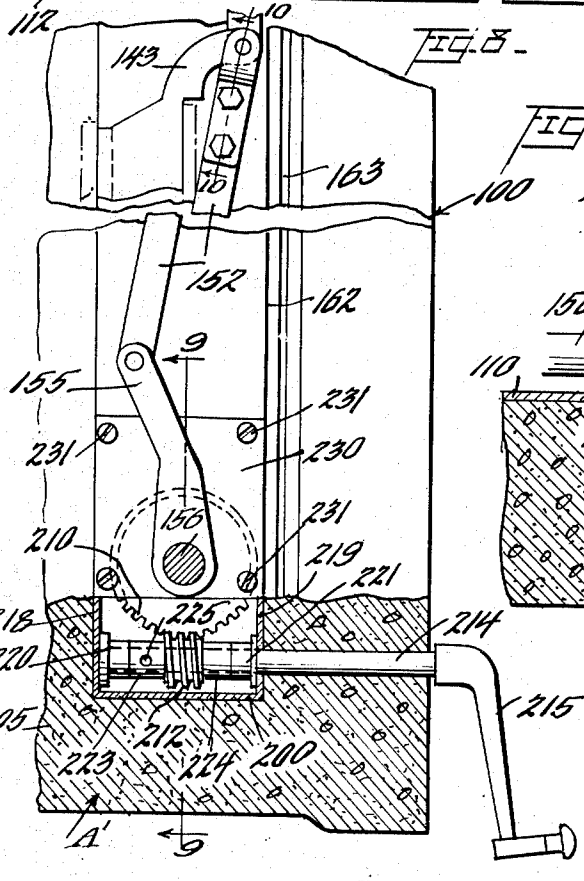


FIG. 9.

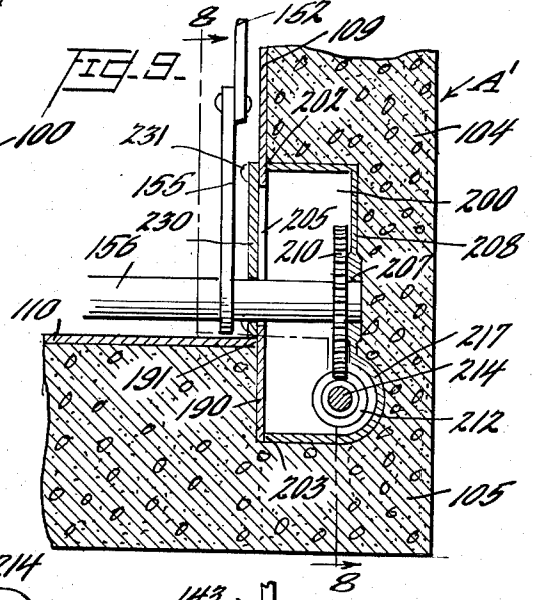


FIG. 10.

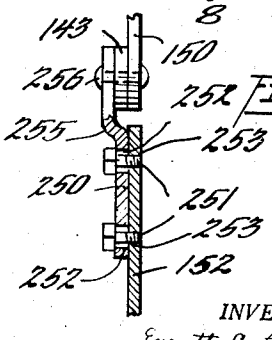
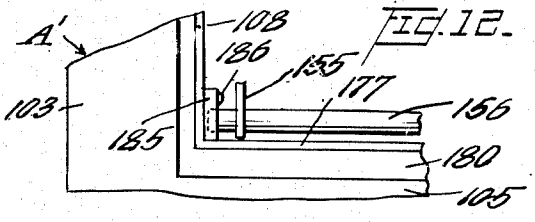


FIG. 12.



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United States Patent Office 2,705,415 Patented Apr. 5, 1955

2,705,415

WINDOW FRAMES

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Application March 14, 1951, Serial No. 215,465

3 Claims. (Cl. 72—98)

This invention relates to precast window frame or trim installations and has for its principal object the provision of a composite metal and concrete framing of one-piece or monolithic construction in which the metallic frame proper is embedded in the concrete trim portion during the precasting operation, with only those portions exposed which support the sash and provide sealing contact therewith.

It is the general object of the invention to provide a novel and improved window installation which is particularly suited for use in the building of masonry or concrete structures, which is adapted for embodiment in double-hung, casement, and awning types of windows, and which is constructed for as complete weatherproofing as it is possible to attain.

Prior proposals looking toward the provision of monolithic window trim have been made, but have not been notably successful nor have they gone into widespread use. The metal framing heretofore has been secured within the precast concrete trim member by bolting it to socketed metal inserts placed at spaced intervals in the concrete trim. In an effort to prevent leakage around the metal frame and to make the assembly as weatherproof as possible, the frame was bedded in plastic caulking compound, but this expedient is expensive and of doubtful permanence.

The novel and improved composite unitary framing provided by the present invention does away with these deficiencies and affords a compact, permanent, easily precast and installed window or other closure for building structures.

Another important feature of the invention is the embedment of the principal portion of the window operating mechanism in the concrete trim during precasting thereof, and this novel improvement is particularly applicable to windows of the awning and casement types.

In the present arrangement, an extruded metal frame having anchoring flanges provided at appropriate places thereon is at least partially embedded in the monolithic trim during casting and very little of the metal frame projects from the contour of the trim. This serves as a protection to the flanges of the metal frame so that it will not be readily bent or distorted during handling or shipment but will maintain its shape and rigidity so that there will always be a proper fit between the sashes, casements or other movable parts of the window, and the frame. Savings in labor and the cost of fastening elements will also be effected by the provision of the composite framing by a single casting job.

The principles of the invention are adaptable to openings of a wide variety of functions and constructions, and the illustrated embodiments show the invention as applied to double-hung windows and windows of the multiple sash awning type.

It is also an object of the invention to provide novel and improved methods for constructing the framing installations.

Other objects and features of novelty, including numerous novel details of construction of the metal window frames to adapt them to various window combinations, will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

Figure 1 is a view in front elevation of a double-hung window embodying the principles of the invention;

Figure 2 is a vertical transverse sectional view on an enlarged scale through the window and taken on line 2—2 of Figure 1;

Figure 3 is a view in horizontal section taken on line 3—3 of Figure 1;

Figure 4 is a view partly in perspective and partly in vertical section of the window frame showing clearly the contours of the concrete trim portion and the extruded metal frame insert;

Figure 5 is a fragmentary view in elevation of an awning type window embodying the composite framing features of the present invention;

Figure 6 is a vertical transverse sectional view taken on line 6—6 of Figure 5;

Figure 7 is a horizontal transverse sectional view taken substantially on line 7—7 of Figure 5;

Figure 8 is a fragmentary view in vertical section taken substantially on line 8—8 of Figure 9 and showing the sash operating means for the awning type of window;

Figure 9 is a fragmentary sectional view taken on line 9—9 of Figure 8;

Figure 10 is a detail sectional view taken on line 10—10 of Figure 8;

Figure 11 is a detail view in perspective of one of the sash hanging elements of the awning window; and

Figure 12 is a fragmentary view in elevation looking toward the window from the inside thereof and showing in the lower left-hand corner of the installation the means for rotatably supporting the left-hand end of the operating rock shaft 156.

As previously indicated, the principles of the present invention are susceptible of embodiment in a wide variety of windows and other openings in building structures and as an example of such applications, the invention will first be described in connection with the double-hung window illustrated in Figures 1–4 inclusive of the drawings. This window installation in its entirety is designated by the general reference numeral 10 and will be seen to consist of the monolithic concrete trim portion A and the inwardly disposed metal frame B. This composite installation is adapted to be prefabricated as a unit for ready transportation and installation, the metal frame proper being embedded solidly and permanently within the monolithic trim portion during the casting operation.

The concrete trim portion A may be of any desired configuration, one example being shown in the drawings as comprising the lintel 12, the sill 13, and the side members or jambs 14 and 15. The entire outer peripheral surface of the trim A is preferably provided with trough-like recesses or grooves such as indicated at 16 for the reception of mortar so as to firmly key the window installation to the wall in which it is positioned. Suitable metal reinforcing rods are suggested at 18 and these may take various forms or may be omitted altogether in some cases.

Centrally of the thickness of the trim member A, the metal frame proper which is designated by the reference character B is disposed with projecting portions embedded substantially throughout the periphery of the member within the concrete body of the trim A.

In the upper portion of Figure 2, the lintel element of the metal frame B is designated 20 and comprises the rather broad plate portion 21 terminating in a right-angled flange 22 at its inward edge and at its outer edge in a squared substantially U-shaped box-like projection 23. For interlocking and securely anchoring the lintel element 20 in the concrete trim A when it is cast, the inner facing portion 22 is extended into the concrete as a flange 25, a similar but shorter flange 26 extends into the concrete from an intermediate portion of the wide surface 21, and a similar flange 27 extends from the part 23 of the lintel. All three of the flanges 25, 26 and 27 are preferably provided at their inner edges with anchoring angular flanges 30.

The sill element 32 of the metal frame B is clearly shown in the lower portion of Figure 2 and this portion presents an unobstructed wide surface terminating inwardly in the vertical facing 33 which has an upward projection 34 and a flange 35 which enters the concrete of the sill portion 13 of the trim A, and is provided with a locking or anchoring flange 30. An outer facing portion 36 is formed on the sill element 32 and this portion is

also provided with an embedded flange **37** having an anchoring edge flange **30**. An intermediate embedded flange **38** extends from the sill element **32** and this also is provided with angular locking flanges **30**.

An inspection of Figure 3 will reveal how the jamb or side elements of the embedded metal frame B are formed in the exemplary embodiment. Each of the jamb elements **40** is provided with stepped plate portions **41** and **42** which provide a shoulder at **43**. Inwardly of the plate portion **42** there is formed a box-like projecting portion **45**, this portion forming with the plate **42** a shoulder or wall **46**, a portion of which extends inwardly of the opening to provide a flange. The box-like portion **45** is also provided with a groove as at **47** within which a screen may be guided. An inner facing portion **48** completes the metal portion of the framing at the inner side of the jamb. Three embedded flanges **50**, **51** and **52** are carried by the jamb elements **40** and these flanges may be provided with the usual anchoring heads or flanges **30**. The jamb elements **40** on both sides of the window frame are identical and the same reference characters are applied in each case.

For the purpose of properly carrying the sliding sashes of this double-hung window embodiment, channel-like supplemental jamb strips or runners are provided, in association with the jamb elements **40**. These channel strips are indicated at **55** and comprise the base flange **56**, the outer exposed flange **57** and an inner flange **58**, which latter flange forms a division plate between the upper and lower sashes of the window. The channel or guide strips **55** may be secured to the jamb portion of the assembly by means of the countersunk screws **59** which are received in the internally threaded socket elements **60** embedded in the concrete of the trim A, these screws passing through the portion **41** of the jamb section **40** of the metal frame B. Alternatively, the strips **55** could be secured to the metal frame portion **40** in various ways, providing only that the securing means be of a detachable nature so that the sashes might be removed after installation of the window framing.

For the purpose of more firmly anchoring the jamb portions **40** of the frame B in the concrete of the trim A, it might be desired to employ a similar socket insert **61** behind the plate **42** of the metal jamb **40** and employ a countersunk screw **62** which passes through an opening in the portion **42** of the jamb.

The upper sash member is indicated at **65** and the lower sash at **66**. Each of the rectangular sash frames is provided with channel-like outwardly opening marginal portions. Both sashes are provided with glass panes as at **68**, the panes being held in place by conventional beading **69**. The upper cross member **70** of the upper sash, shown in Figure 2, is adapted to abut the lintel surface **21** when the sash is in its uppermost position, the outside surface of the cross member **70** lying against the downwardly projecting U-shaped portion **23** of the lintel frame. For properly weatherstripping the upper part of the sash a section of spring weatherstripping **72** is provided, one edge of the spring element being seated in the pocket **73** formed in the edge of the sash. The lower cross member **75** of the upper sash is of a simple channel shape, however with a horizontal flange **76** formed on the inner leg of the channel. The upper box-like cross member **77** of the lower sash is provided with a horizontal flanged extension **78** forming a pocket within which a spring weatherstripping element **79** is received so as to abut the flange **76** of the upper sash when the sashes are in closed position.

The lower cross member **80** of the lower sash is provided with a similar weatherstrip element **81** which functions in the same way as the element **72** of the upper sash, the weatherstrip member bearing snugly against the surface **32** of the sill portion of the metal framing B. The lower element **80** of the lower sash seats behind the flange **34** of the sill and is provided with an overhanging substantially horizontal flange **83** which provides a handhold for raising and lowering the sash.

The arrangement of the side members of the sashes and the guiding of the sashes in their vertical movements will be clearly seen from an inspection of Figure 3 of the drawings. The outwardly opening channel-like side portions of the sash frames may be given the common designation **85** since they are substantially identical in form. The outer and upper sash **65** is received between the inwardly disposed flange **46** of the metal frame B and the flange **58** of the channel strip **55**, while the inner and lower sash **66** is received for vertical movement within the flanges **57** and **58** of the strip **55**. A spring weatherstrip element **90** of generally U-shaped section is clamped around the flange **58** and has outwardly bowed legs against which the side elements of the upper and lower sashes bear. Between the flange **57** and the outer face of the upper sash and between the flange **46** and the inner face of the lower sash, there may be disposed additional packing elements **92** to further seal the margins of the sashes.

Any suitable screen device may be inserted to be guided within the grooves **47**.

In Figures 5–11 of the drawings there is disclosed for purposes of further exemplification of the adaptations of the present invention, an awning type of window in which horizontally pivoted sashes are adapted to be swung to open and closed position by suitable operating mechanism. The novel composite unitary precast framing unit in this embodiment is designated generally by the reference numeral **100**, the concrete trim portion thereof being indicated at A′ and the interlocked and embedded metal frame member designated by the reference character B′. As in the previously described embodiment, the metal frame portion of the unitary structure surrounds the opening formed by the concrete trim, embracing a somewhat thickened intermediate portion of the trim. Preferably the metal frame is made up of sections of extruded corrosion-resisting metal, these sections being appropriately shaped to provide lintel, jamb, and sill elements of the rectangular frame. If desired, the strips may be joined at the corners in any suitable way as, for example, by mitering the ends of the sections and connecting them by welding. In the present embodiment, there is an exception to this mode of joining the adjacent ends of the jamb and sill strips, as will be evident as the description proceeds.

In the illustrated embodiment, the lintel portion of the concrete trim block is indicated at **102**, the jamb portions thereof at **103** and **104**, and the sill portion at **105**. Similar portions of the metal frame B′ are designated as follows: the lintel element by the numeral **107**, the jamb portions by the numerals **108** and **109**, and the sill element by the numeral **110**.

Suitable reinforcing elements **112** may be embedded in the concrete trim A′.

The swinging sashes are clearly shown in Figures 5, 6 and 7 of the drawings, the upper sash being given the general designation **115** and the lower sash **116**, each sash comprising a rectangular metal frame **118** and **119**. Brackets **120** are bolted as at **121** to the upper corners of each of the frames **118** and **119** and upward angularly projecting arms of these brackets are pivoted as at **122** to the jamb portions **103** and **104** of the concrete trim A′. Recessed threaded inserts **123** may be cast into the trim block and the bolts **122** threaded therein as clearly shown in Figure 7 of the drawings.

The lintel strip **107**, as in the case of the similar strip **20** in the double-hung window embodiment, is provided with edge flanges **125** and **126** and an intermediate flange **127**, all of these flanges having anchoring angular flanges **129** preferably at their inner embedded edges. The lintel strip **107** is shouldered as at **130** to accommodate a screen which will be described presently. The flange **126** which is partially exposed at the outer portion of the window is provided with a recess **132** within which may be snapped a metal drip guard **135**. The vertical flange **136** of the upper sash frame **118** abuts the outer corner of the lintel plate **107** when the sash is in closed position and forms a close sealing junction therewith.

Near each outer end of the lintel strip **107** of the metal embedded framing, an opening is provided which lets into the interior of the embedded box **140** which is enclosed within the lintel portion **102** of the concrete trim A′ when it is formed. This box provides a relief or recess which houses the upper end of the system of the operating linkage which serves to swing the window sashes. It will be seen from an inspection of Figure 7 of the drawings that the main portions of the sash frames **118** and **119** are spaced away from the jamb strips of the metal frame a slight distance and the outwardly facing flanges **141** of the sash frames extend across and cover the intervening space between the sash frames **118** and **119** and the window frame proper represented at B′. The recessed box **140** forms in effect an upward continuation of the space or pocket **141′** within which the linkages are disposed.

The upper corners of each of the sashes **115** and **116** are provided with angular brackets **142** and **143**, which are shown in detail in Figure 11 of the drawings. These brackets **142** and **143** are provided with the hook-shaped extended end portions **144** and flanges **145** which may be bolted to the sash frames. An opening **146** is formed in each of the hooked ends **144** and pivot bolts pass through these openings in order to connect the brackets **142** and **143** to the operating linkages. These linkages comprise connecting links **150** which are pivoted at their upper ends to the upper brackets **142** and at their lower ends to the lower brackets **143**. The lower brackets **143** are connected by means of the links **152** to the ends of operating crank arms **155** which are rigidly secured to the operating crank shaft **156** suitably secured at the lower portion of the window and operated by devices yet to be described.

Returning now to the detailed description of the metal frame portion B' of the novel composite framing assembly **100**, it will be seen from an inspection of Figure 7 of the drawings that the jamb strips **108** and **109** are provided with edge flanges **158** and **159** and an intermediate flange **160**, all of which flanges are preferably provided with angular anchoring flanges **161**. The outer edge flange **158** is partially exposed and serves as a sealing abutment for the sash flange **141**, while the inward portion of the jamb plate **108** is shouldered as at **162** and provided with a longitudinal indentation or groove **163** to accommodate a removable screen suggested at **165**. The screen frame **166** abuts the shoulder **162** and spring-pressed buttons or other detent elements **167** are adapted to enter the grooves **163**. The screen frame is notched out as at **168** to receive the edges of the screen wire represented diagrammatically at **169**. The screen frame may be extended toward the sash as at **170** in a position to be abutted thereby when it is closed.

The sill strip **110** of the metal frame B' is shown in section in Figure 6 of the drawings and it includes the outer and inner edge flanges **172** and **173** and the intermediate flange **174**, these flanges being at least partially embedded in the concrete of the sill portion **105** of the concrete trim A'. Suitable anchoring flanges **175** are provided at the inner edges of these embedded flanges. The exposed portion of the flange **172** provides sealing abutment means for the flange **176** of the lower portion of the lower sash frame **119**. The sill plate **110** is shouldered as at **177** for accommodation of the screen which has already been described, and just inwardly of the inner edge flange **173** there may be set a separately formed sill member **180**, if desired, this additional sill member being set in cement as at **181** upon the inner portion of the sill section **105** of the concrete trim.

The operating rock shaft **156** which extends across the opening just above the sill element **110** of the metal portion of the framing is rotatably carried at its left-hand end (as viewed facing out of the window) in a bearing opening formed in the block **185** which may be secured to the face of the chamber section **180** as by means of the screw **186**. At the opposite side of the window is provided the operating mechanism for rotating the shaft **156** and this mechanism is clearly disclosed in Figures 8 and 9 of the drawings.

The sill element **110** of the metal window frame abuts the extended portion **190** of the vertical jamb plate **109** as at **191**. Disposed behind the lower end of the jamb element **109** in this corner of the window, embraced to some extent by the side flanges **158** and **159** of that element and embedded within the concrete of the monolithic trim block A' where the jamb and sill portions thereof meet, is the box **200**. This box may be held in place with relation to the jamb plate **109** by temporary means during the pouring of the concrete so that it will be embedded therein, or it may be permanently secured to this plate as at **202** and **203**, by welding if desired. A relatively large opening **205** is formed in the face of the jamb plate **109** and this opening is shaped to accommodate the right-hand end of the shaft **156** which passes therethrough, traverses the width of the box **200** and finds its bearing in the opening **207** in a thickened portion of the rear wall **208** of the box. The end portion of the shaft **156** carries the worm gear **210** which meshes with the worm **212** carried upon the crank rod **214** which is adapted to be manually operated by means of a detachable crank **215**. The box **200** may be enlarged somewhat as at **217** to accommodate the worm **212** and the side walls **218** and **219** are provided with bearing members **220** and **221** for the shaft or rod **214**. The bearing member **220** is socketed to receive the end of the rod **214** and provide a combined thrust and radial bearing therefor. The bearing element **221** provides a radial bearing for an intermediate portion of the rod, and between these bearings the worm element is disposed, this element comprising the worm proper **212** and bushing or sleeve extensions thereof **223** and **224**. A cotter **225** may be passed through one of the sleeves **223** or **224** and the rod **214**, to key the worm assembly on the rod **214**. A cover plate **230** is applied to the opening **205** which leads through the jamb plate **109** into the interior of the box **200**, this cover plate being secured by means of screws **231**. The operating parts may be introduced into the box **200** through the opening **230** and access may be had through this opening for purposes of repairing or removing the parts. The box **200** may be partially filled with lubricating grease and in ordinary usage, the lubricant will not have to be renewed except perhaps at extremely long intervals.

The operation of the windows disclosed in Figures 5–12 inclusive will be readily understood. With the window sashes **115** and **116** in closed position as shown in Figures 5, 6 and 7, the crank **215** may be rotated to rock the operator shaft **156** and swing the cranks **155** outwardly and downwardly as in the direction of the arrow X shown in Figure 6. During this movement the links **152** pull the lower sash brackets **143** in a downward direction thus swinging the lower sash **116** outwardly about its pivots **122**. The upper links **150** exert a similar downward pull on the upper sash brackets **142** and this serves to swing the upper sashes **115** outwardly around their hinge points **122**. The cranks **155** will not collide with the flanges **141** of the window sashes since by the time the ends of the cranks reach these flanges the sashes will have begun to swing outwardly and upwardly.

In order to assure that the window seals tightly against the metal framing when in closed position, adjusting means are provided for each of the linkages **150** and **152** for operating the sashes. The means for adjusting these linkages is clearly shown in Figures 8 and 10 of the drawings with reference to the links **152**, and the adjustment for the upper links **150** is identical and need not be separately described. The upper end of each link **152** includes a stub extension element **250**, the principal portion of which lies against the link **152** and is adjustably secured thereto by means of the screws **251**. These screws pass through slots or elongated openings **252** in the extension **250** but are threaded into openings **253** in the link proper. The end of the part **250** is offset slightly as at **255** and is provided with the opening through which the pivot pin **256** passes. This pin passes through similar openings in the lower sash bracket **143** and the lower end of the upper link **150**. It will be readily understood how the extension **250** may be adjusted by means of the screws **251** to vary the effective length of the links **152**.

In the embodiment of the invention just described, there is not only provided a novel composite framing installation comprising a concrete trim interlocked with a metal inner frame, but means are also provided within the contour or outlines of the composite element for concealing and snugly disposing the greater portion of the operating mechanism.

Various changes and modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as determined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A window installation comprising a precast unitary composite framing member, said member comprising an endless monolithic concrete trim and a metal frame outlining the window opening in the concrete trim and being at least partially embedded within the mass of concrete of the trim during casting but having a continuous exposed portion around the window opening, a pivoted window sash disposed within said window opening and adapted to seat against the exposed portions of the metal frame when the window is closed, a sash operating shaft rotatably mounted in said framing member within said

window opening and means operatively connecting said sash with said rock shaft, a box-like receptacle embedded within the mass of concrete of said trim behind a portion of said metal frame, one end of said rock shaft extending snugly through an opening in the metal frame into said receptacle, gearing in said receptacle for actuating said rock shaft, manually actuated means extending snugly through another opening into said receptacle for actuating said gearing said receptacle being imperforate except for said openings, said rock shaft and said actuating means fitting snugly in the respective receptacle openings, and said casing being adapted to contain a body of lubricant to lubricate said gearing.

2. A pre-cast unitary composite framing member for application as a unit to the window openings of building structures, said member comprising, in combination, an endless monolithic concrete trim portion constituting the bulk of the framing member and forming the outer peripheral part thereof which is adapted to be set and secured in the building opening, and a second inwardly disposed metal frame portion integrally interlocked with and embedded in the concrete of the outer portion during casting and outlining the sash-receiving opening in the latter; said metal frame portion having substantially continuous parallel side flanges embedded in the radially inward part of the concrete trim portion around the opening, and also having substantially continuous exposed parts around the opening as for attachment and sealing contact with the sash of a window; a hollow box-like metal casing forming a part of the metallic portion of the composite structure, being substantially flush with the continuous exposed part of the metal frame portion so as not to interrupt the even contour thereof, and embedded more deeply into the concrete trim portion; window operating gearing housed within said casing, said casing being adapted to contain a body of lubricant to lubricate said gearing, openings through which connecting and operating elements of said gearing extend from the casing, said elements fitting said openings snugly in order to prevent the escape of lubricant, all whereby a composite pre-formed window framing structure with substantially self-contained operating gearing may be pre-formed with said parts concealed so as not to interrupt the conventional regular contour of the window frame.

3. A composite framing member for use in window installation comprising, in combination, concrete trim portions constituting the bulk of the framing member and forming the outer peripheral part thereof which is adapted to be set and secured in the building opening; inwardly disposed metal frame portions integrally interlocked with and imbedded in the concrete of the outer portions during casting and outlining the sash-receiving opening in the latter, said metal frame portions having parallel side flanges imbedded in the radially inward part of the concrete trim portions around the opening, and also having exposed parts around the opening as for attachment and sealing contact with the sash of the window; a hollow box-like metal casing forming a part of one of the metallic portions of the composite structure, the inner side of said casing being substantially flush with the exposed part of said metal frame portion so as not to interrupt the even contour thereof, the sides of said casing except said flush side being completely enclosed by said concrete trim; window operating gearing housed within said casing, said casing being adapted to contain a body of lubricant to lubricate said gearing; openings through which connecting and operating elements of said gearing extend from said casing, said elements fitting said openings snugly in order to prevent the escape of lubricant, all whereby a composite window framing structure with substantial self-contained operating gearing may be formed with the parts of said gearing concealed so as not to interrupt the conventional regular contour of the window frame.

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