Feb. 20, 1940. C. J. SULLIVAN 2,191,123

BUILDING CONSTRUCTION

Filed May 21, 1938 2 Sheets-Sheet 1

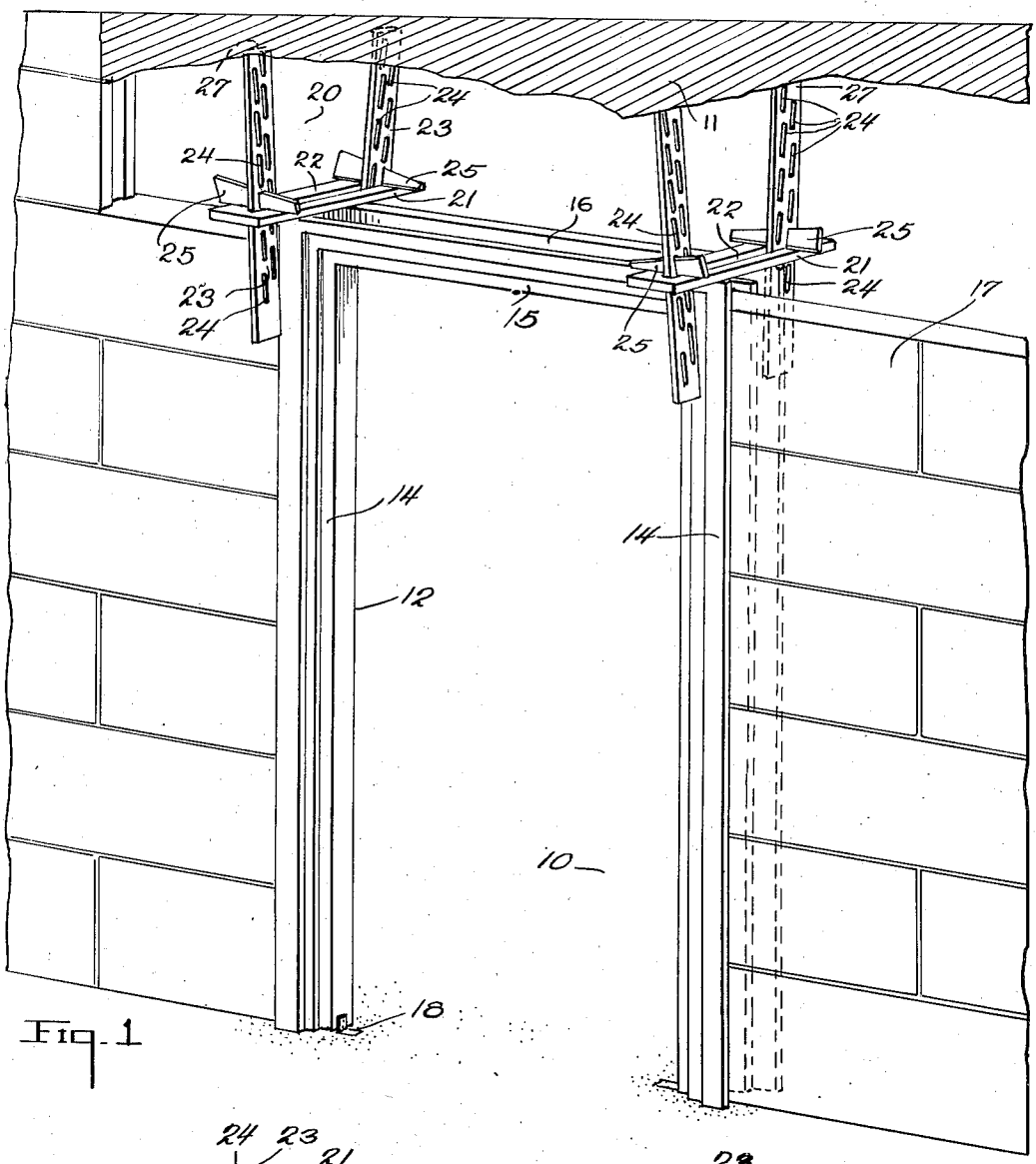


Fig. 1

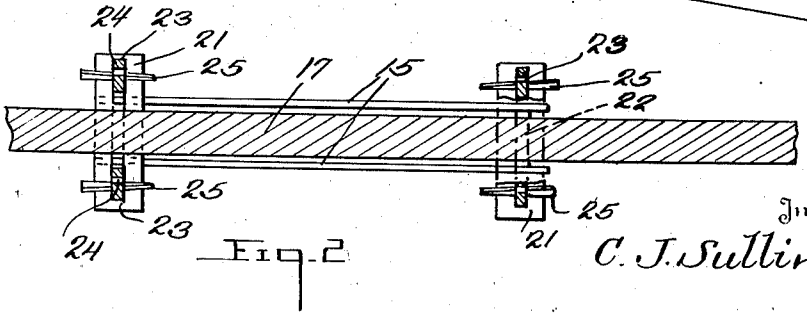


Fig. 2

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Fig. 3

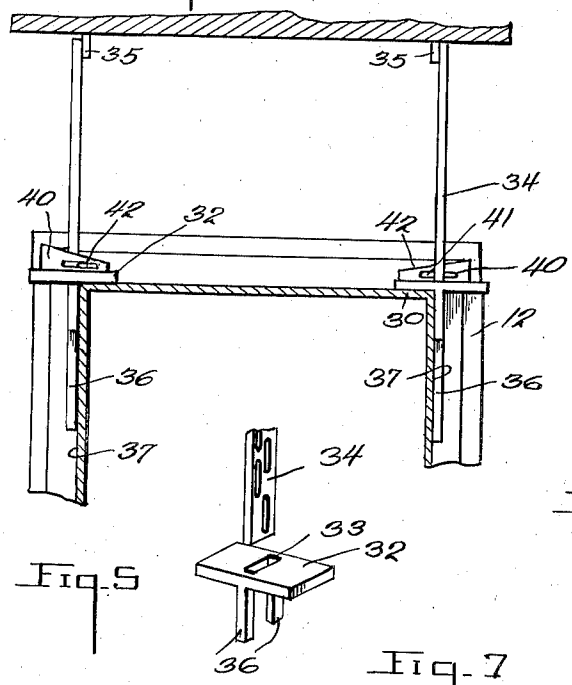


Fig. 4

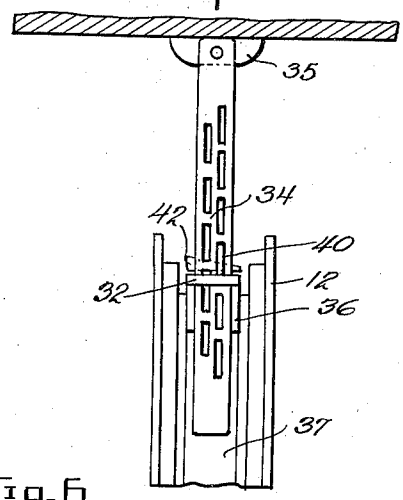


Fig. 5

Fig. 6

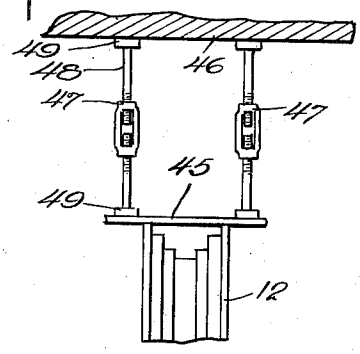


Fig. 7

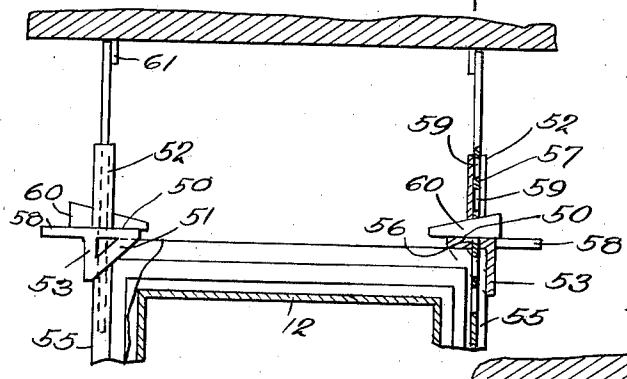


Fig. 8

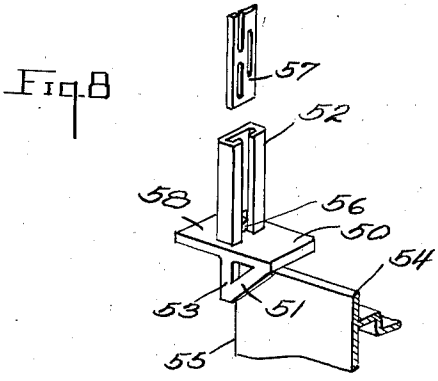


Fig. 10

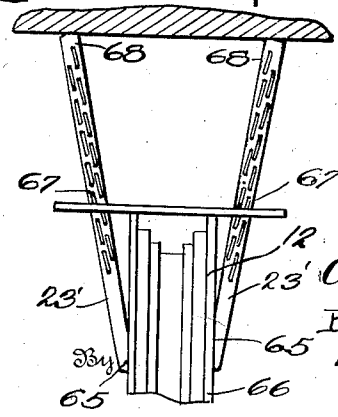
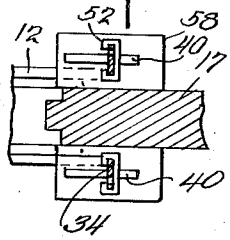


Fig. 9



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UNITED STATES PATENT OFFICE

2,191,123

BUILDING CONSTRUCTION

Charles J. Sullivan, East Falls Church, Va., assignor to John L. Barr, Washington, D. C.

Application May 21, 1938, Serial No. 209,326

18 Claims. (Cl. 72—98)

This invention relates to building construction and more particularly to fire-proof building construction.

It is a general object of the present invention to provide novel and improved apparatus for use in building construction.

An important feature of the invention resides in the provision of braces or clamps for securing window and door frames or bucks in position in fire-proof buildings prior to and during the building of partition or curtain walls about them.

Another feature of the invention consists in the provision of braces or supports for window and door frames adapted not only to support the same in proper position during the building of the surrounding wall structure, but which may be left in position to brace and support the frames during the life of the building and which do not interfere with the masonry construction about the frames.

A further important feature of the invention resides in the provision of braces adapted to be interposed between a ceiling or overhead floor slab or beam and upper surfaces of a frame or buck for clamping the same against the floor or other masonry support and which maintain the frame in position and vertical alignment by providing components of thrust at right angles to the general plane of the frame.

A further feature consists in the arrangement of the clamp means for extreme convenience in use, for simplicity, strength, cheapness and compactness.

In the construction of modern fire-proof buildings it is the general practice to complete the structure by first forming parallel spaced floor slabs of concrete and/or tile supported one above the other on suitable columns of steel or reinforced concrete or both, and to subsequently fill in the outside or curtain walls and the inner partition walls, neither of which are bearing walls as their names imply. The outer walls must be provided with the necessary windows and door openings, while the partition walls must at least be provided with door openings where required. Because there is nothing available except concrete or masonry both below and above the door and window frames, which must be carefully positioned before the fire-proof walls are arranged about them, it has been found exceedingly difficult to secure them into the proper position and vertical alignment while the walls are being built up to surround them. Heretofore the crudest forms of wooden braces and wedges have been used, it often being necessary to carry these braces laterally and diagonally to the next adjacent partition wall to have abutments for them. Obviously such devices are not only insecure but seriously in the way of workmen. Being made of wood they are subject to shrinkage and warping where exposed to the weather and there is considerable likelihood of the frames being drawn out of position or out of plumb before the wall material is in place.

In accordance with the present invention, a simple yet wholly adequate arrangement of clamps or braces is provided made wholly of metal and arranged to extend between an upper surface of the frame and the under surface of the ceiling or floor slab above and to exert downward thrust to clamp the frame tightly against the floor beneath it or if it be a window frame, the masonry or other support for the lower surface thereof. Provision is made for adjusting the thrust at either side of the frame so that it can be plumbed and aligned as required.

For more complete understanding of the invention in its several aspects, reference should be had to the accompanying drawings and following specification wherein are disclosed several exemplary embodiments, with the understanding that such changes, combinations and modifications thereof may be made as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawings:

Figure 1 is a perspective view of a door frame or buck shown clamped in position by devices constructed according to one form of the present invention and with the fire-proof partition wall nearly completed thereabout;

Figure 2 is a plan view of a door frame with the clamps of Figure 1 applied, showing the partition built above the frame;

Figure 3 is a fragmentary vertical section through the central plane of a frame shown as clamped in position by a modified form of brace and clamp of the present invention;

Figure 4 is a side elevation of the arrangement of Figure 3;

Figure 5 is a perspective view of parts of the clamp mechanism of Figures 3 and 4 shown dissembled;

Figure 6 is a view looking from the side or edge of a frame showing it held in position by a further embodiment of the invention;

Figure 7 is a view similar to Figure 3 showing a still further embodiment of the invention;

Figure 8 is a perspective view of one corner of

a frame and clamping means constructed according to Figure 7;

Figure 9 is a top plan view of a fragment of a frame shown positioned with a pair of clamps of the type shown in Figure 8, portions of these being in horizontal section; and

Figure 10 is an edge view of the top portion of a frame secured in position with mechanism somewhat similar to that of Figure 1.

Referring now to Figures 1 and 2, there is shown at 10 a fire-proof floor slab of either monolithic concrete or concrete and tile adapted to receive any suitable type of floor finish as may be required. At 11 is shown the slab forming the ceiling of the space above the floor 10 and the floor surface for an additional story. At 12 is shown a door frame, or as more generally known in the trade, a buck. It is to be understood that while only a door frame is illustrated, it might equally as well be a window frame in which case instead of being mounted directly on the floor surface it would be supported from beneath by several courses of masonry, brick, hollow tile, etc., or by a spandrel-facia.

The door frame as shown in Figure 1, in a fire-proof construction, is of pressed or cast metal bought and installed as a unit properly sized to fit a predetermined door. The vertical side members 14 and the top member 15 thereof are of channel configuration as seen at 16 with the width of opening just slightly greater than that of the masonry units 17 used to build up the partition wall. These units are of some light-weight material which is fire-proof and sound-deadening, and are intended to receive a coat of plaster or other surface finishing material. They have no great strength and it is highly desirable during the process of building of the partition to secure the door buck firmly in position exactly where it is desired and as nearly plumb as possible. Such a door frame if rigidly secured in place is of assistance to the masons in laying up the wall to be truly plumb.

As previously mentioned, difficulty has been experienced in so securing the door frame that it remains positively and firmly in position during the building of the wall. In accordance with the present invention the frame is set wherever desired and if it is considered necessary the lower ends may be secured to the floor slab by suitable small angle members 18 chiefly to maintain the spacing of the sides 14 parallel. To each upper corner of the door buck, or to a position near the corner and along the upper face, is applied one of the clamp members of the present invention generally shown at 20. Each clamp or brace comprises a plate member 21 greater in length than the thickness of the door frame and longitudinally slotted as at 22 between its ends and preferably midway of its width for the passage of the strut members 23 of which a pair are provided for each plate. These are ordinary bar steel of sufficient rigidity provided with a plurality of slots 24 preferably in two rows in staggered relation, each adapted to selectively accommodate a wedge such as 25, the lower surface of which engages the upper surface of the plate 21 to thrust the struts upwardly and to exert a downward pressure on the buck.

As clearly seen in Figure 1, the struts 23 of each pair are splayed outwardly at the top and their upper ends 27, which may be sharpened rounded, or pointed, as desired, are firmly pressed against the undersurface of the floor slab which is ordinarily of sufficient roughness to prevent them from slipping but can be provided with slight indentations by means of a chisel or similar tool if necessary. This splaying insures rigidity and permits adjustment of the plumbness of the door laterally of the plane thereof by adjustment of the wedges 25 which can then be driven tightly home by the use of a hammer.

Under some conditions a single assemblage 20 at or near the center of the upper frame member 15 may be sufficient, but two are deemed advisable arranged as shown to prevent twisting of the frame.

With the door frame clamped as shown, after initial adjustments to secure plumbness and freedom from warp or twisting, it is in condition to have the fire-proof wall applied thereabout and several courses of tile are shown as already completed. When these courses have been built up to the ceiling, with the exception of the space above the door frame, sufficient rigidity will be had to securely hold the frame in position for the blocks of masonry fit closely between the flanges of the frame side members or are fitted thereto with suitable mortar. At this time the clamp sets 20 can be removed and the few remaining tiles applied above the door to complete the partition wall. Under some conditions, however, it may be desirable to leave the clamps in position until all of the partition is completed, as shown in Figure 2. The partition blocks can be built over the plates 21 and the latter driven out horizontally after the mortar has hardened and the struts have been removed. Since the struts are of uniform cross-section throughout their length they can be dropped through the slot when the wedges are driven out. A bit of plaster or mortar will fill up the openings left by the plates.

In Figures 3, 4 and 5 are shown a second embodiment of the invention in which the clamp pressure is applied to the innermost surface 30 of the frame rather than to the top edges or trim portion thereof as in the construction of Figure 1. This arrangement permits the whole clamping mechanism to be confined between the planes of the front and rear faces of the door frame so that, if desired, the clamps may be encased in the masonry, plaster or other finish and left permanently in position to insure tightness and rigidity for the door frame under all conditions in the completed structure. It has been found that where heavy doors are used with strong closers or where such doors are subject to heavy slamming, the ordinary light masonry of a fire-proof partition wall is inadequate to alone support the buck with sufficient rigidity to prevent cracking of the plaster in lines radiating from the upper corners of the door frame. By the construction shown in this embodiment such difficulties are overcome when the clamps are left in position.

It is preferred to use two clamp sets for each frame as shown in Figure 2, each consisting of two parts, first a plate member 32 having a single slot 33 therein to closely receive the strut or thrust member 34 which is quite similar in construction to one of the members 23 in Figure 1 but is preferably provided at the top with a loosely pivoted cap 35 which is free to rock thereon and insure an adequate bearing over a considerable width on the ceiling above. This strut extends transversely to the plane of the door frame. The plate 32 is equipped with integral depending legs 36 one at each end of the slot 33 to form guides for the portion of the strut which

passes through the slot. They also serve to position the plate in the frame for it rests on the upper inner surface 30 with these legs against the corresponding-surface 31 of the adjacent vertical member of the frame. With this disposition of the plate the strut 34 passes down close alongside the outer surface of the portion 37 of the frame and engages against it for the full length of the strut portion protruding through the plate, thereby insuring against lateral movement of the frame or any tendency to get out of square. A suitable wedge 40 is driven through the proper slot in the strut member to force it upwardly and the plate downwardly to clamp the frame tightly in position. If it is intended to leave the clamp members in position after the masonry is installed, this wedge 40 may have a slot 41 to receive a second wedge 42 to hold it tightly in position against slippage.

In Figure 6 is shown an extremely simple form of clamp comprising a plate 45 extending across the upper edges of the frame or buck as in Figure 1 and having extending between its upper face and the lower surface 46 of the ceiling a pair of turnbuckle members 47 each including suitable rod portions 48 having caps 49 preferably semi-universally mounted thereon. By adjusting the turnbuckles to the proper lengths and expanding them by turning the handles, the plate 45 can be thrust downwardly into close engagement with the upper edges of the frame to clamp it tightly against the floor. Because of the considerable spacing fore and aft of the turnbuckles, the door is insured of being held in plumbness until the masonry is built up around it.

Figures 7 and 8 illustrate a device somewhat like that of Figures 3, 4 and 5, but the plate members 50 are additionally provided with a diagonal web portion 51 and a vertically extending guide or sleeve member 52. The web 51 connects the horizontal plate 50 with a depending flange 53. In use, the plate 50 rests on the upper edge 54 of the outermost portion of the door frame as clearly seen in Figure 8, while the flange 53 bears against the outermost vertical edge 55 and the web 51 engages the front face of the trim portion of the frame. The slot 56 is positioned inwardly of the flange 53 so that the thrust of the strut member 57 which passes therethrough is centered and has no tendency to rotate the plate. The vertical sleeve portion 52 previously referred to forms elongated extensions of the walls of the slot 56 to insure guidance for the strut member over a considerable vertical distance so that there is no possibility of canting of the plate in respect thereto in any direction. This permits the plate members to be used with the extensions 58 resting on frames under certain conditions and with the struts overhanging the edges of the frame without the possibility of turning and slipping. Thus there is afforded a means of providing a universal clamp member. The struts are provided with the usual array of slots 59 to receive a wedge 60 as in the previous constructions and their upper ends may be equipped with swivel heads 61 as in Figures 3 and 4. When using clamps as just described, they are preferably provided in similar pairs so that they may be arranged on diagonally opposite corners of the top surface of a door frame as shown in Figure 7 to insure its rigid positioning.

In Figure 9 clamps of the type shown in Figures 7 and 8 are shown as applied in pairs above one vertical member of the frame, it being understood that a similar pair is arranged above the other vertical member. Here the clamps are sufficiently spaced apart so that the wall elements 17 can be passed between them thus enabling the wall to be built clear to the ceiling even in the space directly above the door frame.

Figure 10 shows a slight modification of the device of Figure 1 in which the strut members 23' are somewhat longer and are tapered near the bottom as at 65. In this construction the parts are so assembled that the faces of the tapers 65 bear against the outer surfaces of the trim portions 66 of the front and rear faces of the door frame and insure against movement of the same in a direction at right angles to the plane of the door. In assembling such a clamp unit the wedges 67 are loosely positioned and the upper ends 68 of the struts pulled apart until the lower ends 65 bear tightly against the door frame trim faces and then the wedges are driven home.

Various other modifications of the structures shown are possible and uses not disclosed will readily occur to those skilled in the art. It is of course the intent of the appended claims to cover the applicant's structures and various modifications thereof for uses other than those disclosed.

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

1. Clamping means for fixing in position in fireproof buildings the frames of doors or windows comprising in combination, a slotted plate member adapted to bear on two horizontal portions of the frame spaced on opposite sides of the central plane thereof, a pair of struts slidable in said slot one outwardly of each bearing point of the plate on said frame and movable to engage the ceiling above the frame, and wedging means engaging the plate to individually urge each strut in an upward direction for the purpose described.

2. Clamping means for fixing in position in fireproof buildings the frames of doors or windows comprising in combination, a slotted plate member adapted to bear on two horizontal portions of the frame spaced on opposite sides of the central plane thereof, a pair of struts slidable in said slot one outwardly of each bearing point of the plate on said frame said struts being splayed outwardly to have their ends engage the ceiling at points spaced wider apart than the bearing points of the plate on the frame, and wedging means engaging the plate to individually urge each strut upwardly for the purpose described.

3. Clamping means for fixing in position in fireproof buildings the frames of doors or windows comprising in combination, a slotted plate member adapted to bear on two horizontal portions of the frame spaced on opposite sides of the central plane thereof, a pair of struts slidable in said slot one outwardly of each bearing point of the plate on said frame said struts being splayed outwardly to have their ends engage the ceiling at points spaced wider apart than the bearing points of the plate on the frame, the lower portions of said struts being bevelled to engage the vertical faces of the frame directly below the slotted plate, and wedging means engaging the plate to individually urge each strut upwardly for the purpose described.

4. Clamping means for fixing in position in

fireproof buildings the frames of doors or windows comprising in combination, a slotted plate member adapted to bear on a horizontal portion of the frame, a strut slidable in said slot and extensible to engage the ceiling above the frame, said strut having a plurality of rows of longitudinally extending slots in staggered relation to selectively receive a wedge, the lower face of which bears on the upper surface of the said plate.

5. A frame supporting and clamping device including in combination, a plate member adapted to bear on two horizontal portions of the frame spaced on opposite sides of the central plane thereof, a pair of turnbuckle assemblies adapted to engage the upper surface of the plate outwardly of its bearings on the frame and to also engage the ceiling to thrust the plate downwardly and clamp the frame in position.

6. A frame clamping device of the type described including in combination, an elongated plate member having a transverse slot, a strut member having a sliding fit in said slot, legs depending from said plate each with its inner surface forming an extension of an end wall of said slot, so as to engage the edge of the strut, said strut having a plurality of spaced longitudinal slots therein and a wedge adapted to be selectively received in any of said slots and to bear on the surface of said plate opposite the legs.

7. A frame clamping device of the type described including in combination, an elongated plate member having a transverse slot, a strut member having a sliding fit in said slot, a sleeve-like member extending from the upper surface of said plate with its inner walls forming extensions of the walls of said slot so as to prevent canting of the strut in the plate, said strut having a plurality of spaced longitudinal slots therein, a wedge adapted to be selectively received in any of said slots and to bear on the surface of said plate, said sleeve being slotted to accommodate said wedge.

8. A frame clamping device of the type described including in combination, an elongated plate member having a transverse slot, a strut member having a sliding fit in said slot, a sleeve-like member extending from the upper surface of said plate with its inner walls forming extensions of the walls of said slot so as to prevent canting of the strut in the plate, said strut having a plurality of spaced longitudinal slots therein, a wedge adapted to be selectively received in any of said slots and to bear on the surface of said plate, said sleeve being slotted to accommodate said wedge and a flange depending from said plate in a plane parallel to and spaced from said strut.

9. A frame clamping device of the type described including in combination, an elongated plate member having a transverse slot, a strut member having a sliding fit in said slot, a sleeve-like member extending from the upper surface of said plate with its inner walls forming extensions of the walls of said slot so as to prevent canting of the strut in the plate, said strut having a plurality of spaced longitudinal slots therein, a wedge adapted to be selectively received in any of said slots and to bear on the surface of said plate, said sleeve being slotted to accommodate said wedge, a flange depending from said plate in a plane parallel to and spaced from said strut and an inclined brace connecting one edge of said flange to the corresponding edge of the plate.

10. A device for clamping a metal door buck having channelled side and top members comprising in combination, a plate adapted to bear on the highest horizontal edge of the frame top member, a flange depending from said plate intermediate its ends and adapted to engage the corresponding edge of the adjacent vertical member, a brace connecting said plate and flange and adapted to engage the adjacent face of said frame, a slot in said plate, a strut slidable in said slot, means to wedge said strut upwardly to engage the ceiling above the frame, said slot being so positioned as to guide the strut into the channel of the adjacent side member of the frame.

11. A device for clamping a metal door buck having channelled side and top members comprising in combination, a plate adapted to bear on the highest horizontal edge of the frame top member, a flange depending from said plate intermediate its ends and adapted to engage the corresponding edge of the adjacent vertical member, a brace connecting said plate and flange and adapted to engage the adjacent face of said frame, a slot in said plate, a strut slidable in said slot, means to wedge said strut upwardly to engage the ceiling above the frame, said slot being so positioned as to guide the strut into the channel of the adjacent side member of the frame and a sleeve rigid with said plate and serving to guide said strut to prevent canting in relation to the plate.

12. A frame clamping device of the type described including in combination, an elongated plate member having a transverse slot, a strut member having a sliding fit in said slot, means engaging the plate and strut to urge the strut through the slot and a pivoted head on said strut to bear over a considerable area on the ceiling above the frame.

13. A clamping device to remain permanently in position above a metal door buck formed of channel sections and to be subsequently surrounded by fire-proofing comprising in combination, a plate having a width to fit within the channel of the top member of the frame and rest on the inner surface thereof, a slot in said plate, a strut fitting through said slot and beneath the plate bearing on the innermost wall of a vertical member of the frame, said strut extending above the plate to engage against the ceiling, and means acting between the plate and strut to force the strut upward.

14. For use in fire-proof building constructions, a portable and temporary mechanism for clamping door and window bucks or frames in position until the masonry structure is erected, comprising in combination, an element to bear on a horizontal surface of said buck, a second element slidable in respect to the first and having a portion adapted to bear under the ceiling and means acting between said elements to move the former downwardly and the latter upwardly to press the buck against the floor.

15. For use in fire-proof building constructions, a portable and temporary mechanism for clamping door and window bucks or frames in position until the masonry structure is erected, comprising in combination, an element to bear on a horizontal surface of said buck, a second element slidable in respect to the first and having a portion adapted to bear under the ceiling, means acting between said elements to move the former downwardly and the latter upwardly to press the buck against the floor, and means on one of said elements to engage the buck at a

point considerably below the engagement of the first said element to provide lateral rigidity.

16. A temporary frame supporting and clamping device including in combination, a plate member adapted to loosely rest on a horizontal portion of the frame, a slot in said member, a strut movable in said slot, means acting between said plate and strut to urge the strut longitudinally through said plate, and means on the strut below the plate engageable with a vertical portion of the frame to steady the same laterally until the frame is permanently secured in position by building material.

17. A temporary clamping means for fixing in position in fire-proof buildings until substantially encased in fire-proofing the frames of doors or windows comprising in combination, a slotted plate member adapted to bear removably on a horizontal portion of the frame, a strut slidable vertically in said slot and extending above said plate to engage the ceiling above the frame, and wedging means between the plate and strut to urge them in opposite directions to hold the frame tightly on its lower support.

18. A temporary clamping means for fixing in position in fire-proof buildings until substantially encased in fire-proofing the frames of doors or windows comprising in combination, a slotted plate member adapted to bear on two horizontal portions of the frame spaced on opposite sides of the central plane thereof, a strut slidable in said slot and extensible to engage the ceiling above the frame, and wedging means acting between the plate and strut to urge the plate downward and the strut upwardly to clamp the frame against its lower support.

CHARLES J. SULLIVAN.