April 26, 1955 C. KEFFER 2,706,842

RIGID JACK AND SEPARATE BOARD CONSTRUCTION FORMS

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Fig. 1.

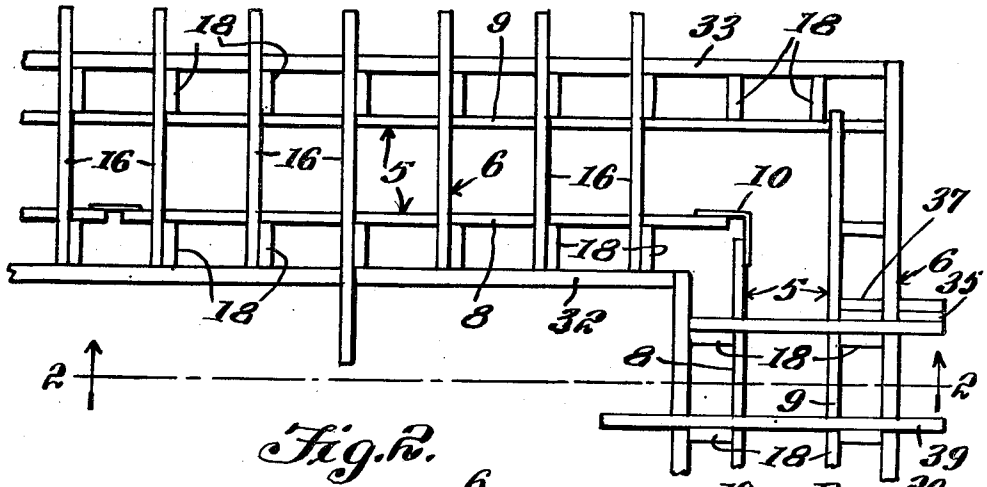


Fig. 2.

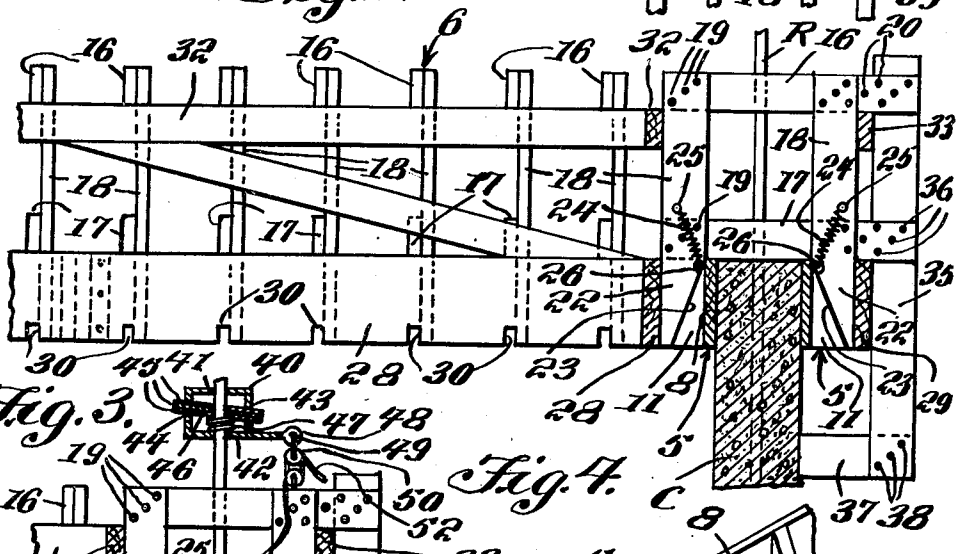


Fig. 3.

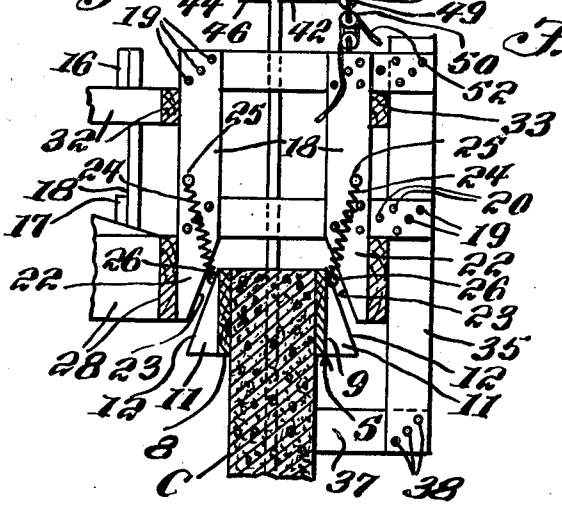
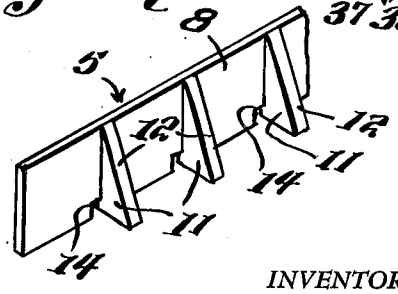


Fig. 4.



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Fig. 5.

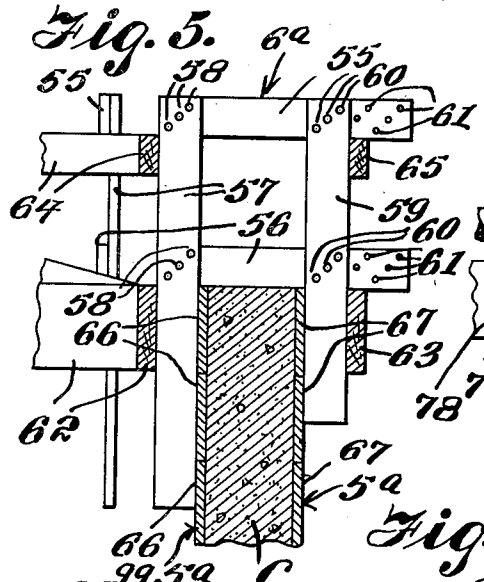


Fig. 6.

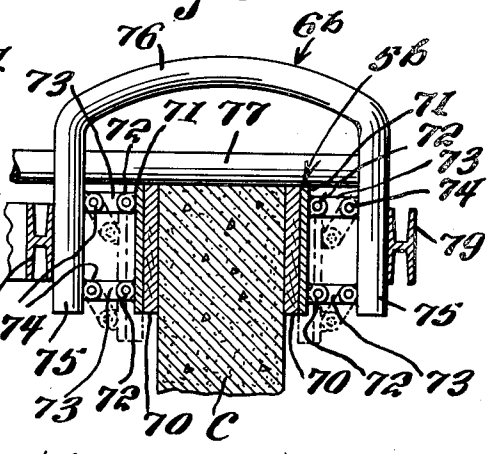


Fig. 7.

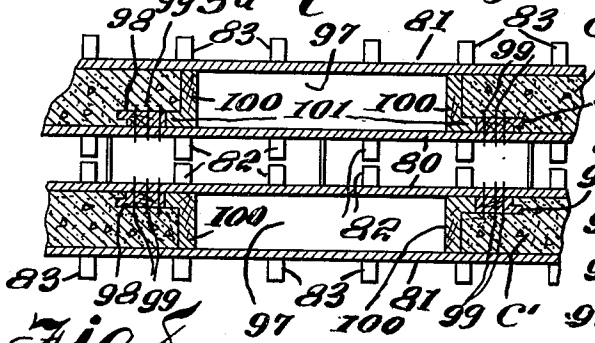


Fig. 9.

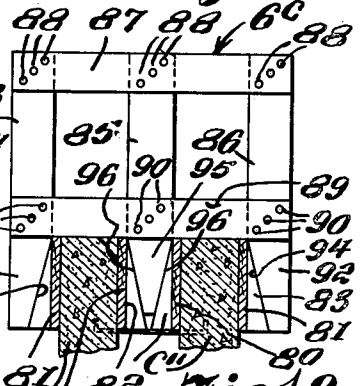


Fig. 8.

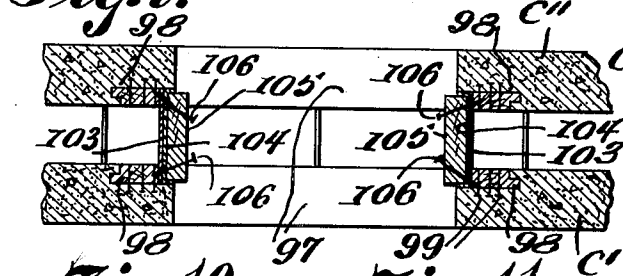


Fig. 12.

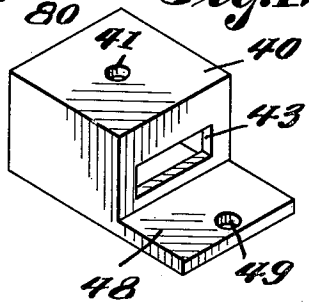


Fig. 10.

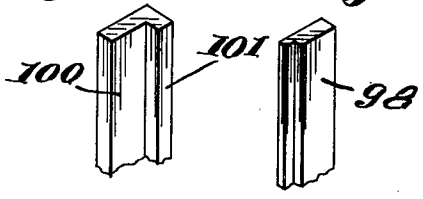


Fig. 11.

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Fig. 13.

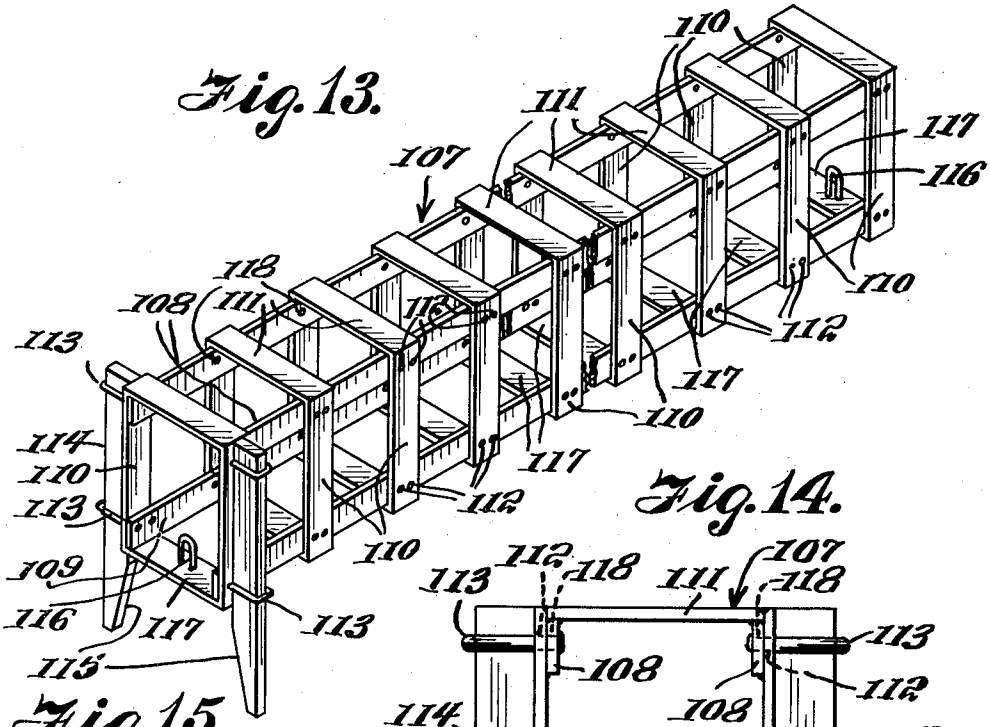


Fig. 14.

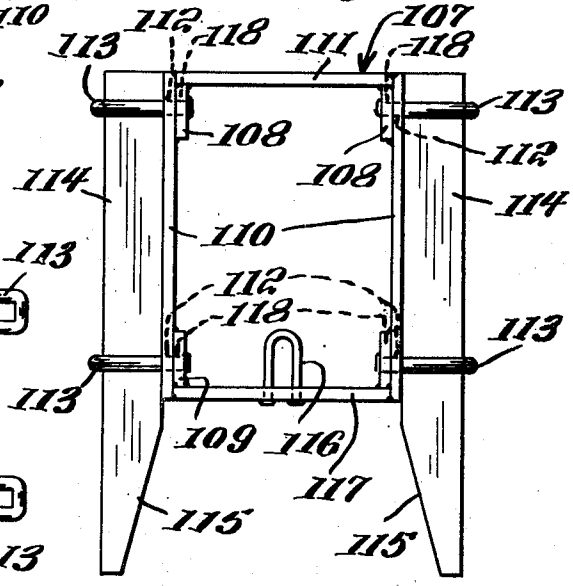
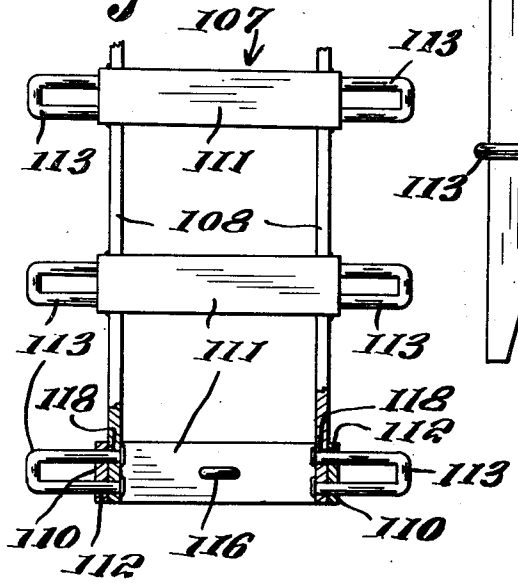


Fig. 15.



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RIGID JACK AND SEPARATE BOARD CONSTRUCTION FORMS

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Fig. 16.

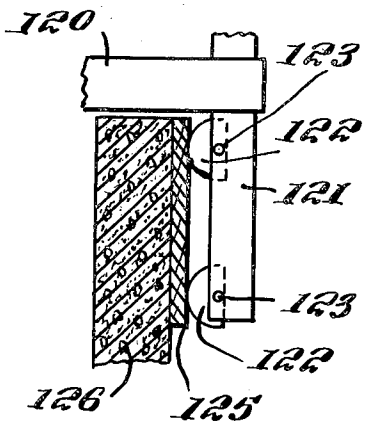


Fig. 17.

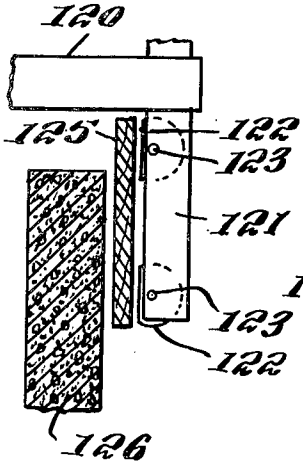


Fig. 20.

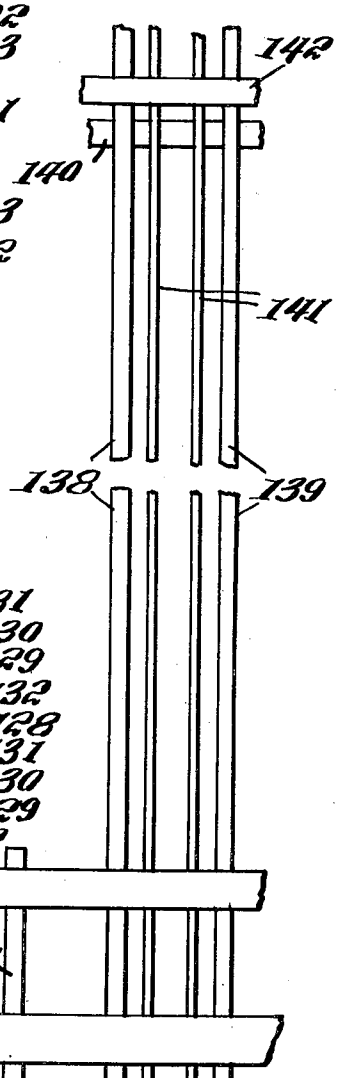


Fig. 18.

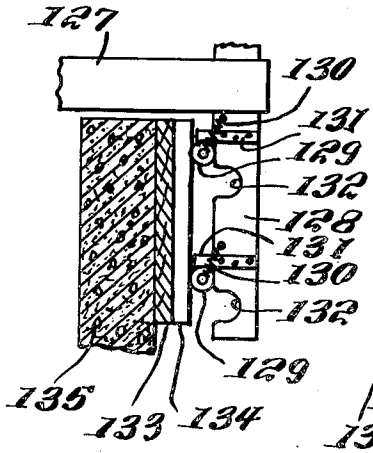
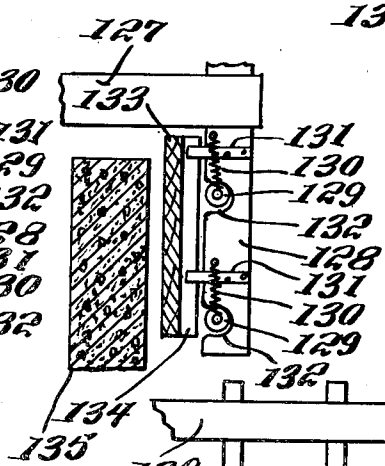


Fig. 19.



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United States Patent Office 2,706,842
Patented Apr. 26, 1955

2,706,842

RIGID JACK AND SEPARATE BOARD CONSTRUCTION FORMS

Cecil Keffer, Kinnaird, British Columbia, Canada

Application November 8, 1951, Serial No. 255,503

4 Claims. (Cl. 25—131)

The present invention relates to improvements in concrete building structures, and more particularly to a wall mold and jack therefor adapted to be employed in forming concrete building walls.

One object of the invention is to provide a novel wall mold and jack therefor which can be used to pour successive areas of a building wall and which can be readily shifted to re-position the wall mold sections as the concrete building wall progresses.

Another object is to provide a wall mold and jack therefor including wall mold sections having oblique surfaces which are adapted to be engaged by correspondingly shaped surfaces on the inner faces of a series of connected jacks to provide mutually engaging wedge surfaces to hold the wall mold sections in place while the concrete is being poured.

Another object is to provide a wall mold and jack structure in which the wall mold sections are yieldingly connected to the jack members such that when the jack member is raised, the mold sections will be similarly raised after the wedging actions between the mutually engaging wedge surfaces has been released.

Another object is to provide a wall mold and jack therefor in which the jack is supported and adapted to be elevated by means of a tackle and block structure connected to a friction gripping device mounted on one of the re-inforcing rods embedded in the lower course of the concrete wall.

Another object is to provide a building wall mold and jack including a U-shaped frame having pivoted link members connecting the legs of the frame with the wall mold sections such that raising and lowering of the frame will cause the links to move in a toggle fashion and project or retract the wall mold sections.

Another object is to provide a wall mold structure for forming double concrete walls and to provide novel means adjacent openings for forming recesses in the ends of the walls adjacent said openings for receiving frame members completely closing off the space between adjacent concrete walls.

Another object is to provide a wall mold structure and jack therefor which is comparatively easy and simple to operate and which eliminates the employment of carpenters heretofore employed in building concrete walls and the extensive labor required to dismantle the wooden mold structures heretofore requiring at least a half dozen carpenters for a single one-course or mold section.

Other objects and advantages of the invention will become apparent during the course of the following description forming a part of this specification, and in which:

Figure 1 is a top elevational view of the wall mold and jack embodying the invention illustrating the manner in which two wall molds are assembled with their ends arranged at an angle of 90° to form the corners of a building.

Figure 2 is a vertical cross-sectional view taken on line 2—2 of Figure 1 and looking in the direction of the arrows to illustrate the manner in which a single jack unit is formed and provided with oblique surfaces for mutually engaging correspondingly shaped surfaces on the outer faces of the wall mold sections.

Figure 3 is a vertical transverse cross-sectional view showing the manner in which the jack units are adapted to be elevated after a wall has been poured and the concrete solidified.

Figure 4 is a fragmentary perspective view of one of the mold sections showing the oblique surface members thereon in spaced apart relation.

Figure 5 is a vertical cross-sectional view of a modified form of the invention showing a slightly different type of wall mold jack to permit the addition of wall mold sections as the building wall progresses.

Figure 6 is a vertical cross-sectional view of a wall mold showing another modified form of the invention in which the jack is formed of metal and is provided with clamping plates for engaging the wall mold sections.

Figure 7 is a fragmentary horizontal cross-sectional view of a still further modified form of the invention showing a mold for a double concrete wall construction.

Figure 8 is a fragmentary horizontal cross-sectional view of a double concrete wall showing the mold sections removed and the manner in which the space therebetween is closed in the area of window and other openings.

Figure 9 is a vertical cross-sectional view showing a fragmentary portion of a double concrete wall with a jack and mold sections in place after the pouring operation.

Figure 10 is a fragmentary isometric view of one of the bulkhead members shown in Figure 8, illustrating the sectional shape thereof.

Figure 11 is a fragmentary isometric view of a molding strip which is attached to the mold sections and temporarily held in place in areas of the concrete wall structure in which openings are located.

Figure 12 is a isometric view of the casing or housing for the reinforcing rod engaging clamp showing the general structure thereof.

Figure 13 is a perspective view of a slightly modified jack structure or jacking frame.

Figure 14 is an end elevational view of the structure of Figure 13.

Figure 15 is a fragmentary top plan view, with parts broken away and in section, of the jacking frame of Figures 13 and 14.

Figure 16 is a detail illustrating a modification and showing a portion of the jack form or structure on one side of a wall wherein thhe form boards are held in position with toggle acting cams pivotally mounted in the jack form.

Figure 17 is a similar view showing the parts with the cams in the released position.

Figure 18 is a similar section showing a further modification wherein rollers or balls are positioned between vertical members or legs of the jack form and form boards.

Figure 19 is a similar section showing the parts in the released position whereby the rollers are positioned in recesses in the vertical members or legs of the jack forms.

Figure 20 is a view illustrating a typical reinforcing rack adapted to be used with the jack frame whereby reinforcing rods are held in desired positions with progressive movements of the jack frame adapted to form a wall around the rods.

In the drawings, and more in detail, there is shown for the purpose of convenience of illustration in Figures 1 to 4 one embodiment of the invention including wall mold sections generally designated 5 and retaining or holding jacks therefor, generally designated 6. The wall mold sections 5 include inner and outer wall mold boards 8 and 9, respectively, formed of wood or suitable material, and of a width to provide a space therebetween to receive concrete when the wall mold sections are supported as shown in Figures 1 and 2. The wall mold section 8 is slightly shorter in length than the wall mold section 9 and the meeting edges of the inner wall mold sections 8 may have affixed thereto an angle shaped plate 10 to form the inner corner of the wall. The outer wall mold sections 9 have their ends arranged to overlap (Fig. 1) to form the external corner surface of the building wall.

Each of the mold sections is provided on its outer face with a plurality of wedge-shaped braces 11 having inclined surfaces 12 which extend obliquely outward

from the upper edge of the wall mold section toward the bottom edge. The wedge-shaped blocks 11 are secured to the wall mold sections 8 and 9 in equi-distantly spaced apart relation (Fig. 4), and the lower edge of each wall mold sections 8 and 9 is provided with a series of correspondingly spaced notches for receiving transverse rods placed across the lower portion of the mold and supported on the upper surface of a partially completed wall.

The movable longitudinal support structure 6 includes a plurality of U-shaped jack frames having transverse frame bars 16 and 17 and side frame bars 18. The frame bars 16, 17 and 18 are secured together by nails or other fastening elements 19. Or if desired, the outermost leg 18 can be adjustably secured to the transverse frame bars 16 and 17 by means of a removable pin for being received in adjustable openings 20 (Fig. 2). The leg portions 18 of each of the jack frames extends downwardly as at 22 and is provided with an inclined surface 23 corresponding to the inclined surface 12 of the wall mold sections to form therewith mutually engaging wedge surfaces, which when lowered in position will securely clamp the wall mold sections 8 and 9 in place and when raised will release said wall mold sections. Coil springs 24 are provided for connecting the legs of the jack frames to the wall mold sections 8 and 9, and as shown the coil springs 24 are affixed to the legs 18 of the jack frame as at 25 and to the wall mold sections as at 26. Thus, the wall mold sections are movably connected to the jack frames.

Secured to the lowermost ends of the jack frame legs 18 are inner and outer connecting frame members 28 and 29 which are provided with a series of notches 30 to correspond in position to the openings 14 in the wall mold sections 8 and 9 and thus accommodate horizontal re-inforcing rods which project laterally from the walls of certain types of concrete building structures. The frame members are connected by nails or the like and hold the jack frame legs 18 in equi-distant spaced apart relation. Similarly, inner and outer jack frame rails 32 and 33 are provided for connecting the upper ends of the jack frames 16—17—18 to maintain the upper ends thereof in vertical alinement. At various intervals diagonal brace bars 34 may be connected to the upper and lower jack frame rails 28 and 32 to additionally re-inforce the same.

It is to be noted, that the jack frame bars 16 and 17 project beyond the outer leg 18 and are connected by means of a gauge frame bar 35 by nails or other fasteners 36. The lower ends of the gauge frame bars 35 have attached thereto gauge arms 37 as at 38 for engaging the outer wall surface of a completed portion of the building wall. The gauge frames 35 are adapted to hold the jack frames in vertical alinement during the pouring of the concrete between the mold sections 8 and 9.

If desired, horizontal brace bars 39 may be attached to the inner and outer jack frame rails 32 and 33 which are slightly longer than the jack frame members 16 and may be used to facilitate handling of each jack frame.

During the course of the building construction re-inforcing rods R are supported such that they will become embedded in the concrete wall, and after the first course of the wall is poured the re-inforcing rod R may be employed for elevating the wall mold jacks 6. This is accomplished by providing a rod clutch including a housing 40 (Figs. 3 and 12) of box-like shape having alined openings 41 and 42 in the upper and lower walls thereof for receiving one of the re-inforcing rods R. The opposed walls are provided with rectangular openings 43 and 44 which are on a slightly different plane and are adapted to receive a series of clamping plates 45 having alined openings 46 in registry with the openings 41 and 42 for receiving one of said re-inforcing rods R. A coil spring 46—47 is mounted beneath the plates 45 to normally urge the same upwardly and hold the same in a canted position as shown in Fig. 3. Thus, when the plates 45 are canted they will be in frictional engagement with the rod R and a downward force exerted on the housing 40 will only tend to lock the housing 40 to said rod. An extension 48 is formed on the rod clutch housing 40 and is provided with an opening 49 for receiving a block and tackle 50. The opposite end of the block and tackle is connected to one of the jack frame bars 16 adjacent the end thereof so that the cable 52 may be pulled by the builder to elevate the jack frames 6. It being understood, that two or more such devices may be provided throughout the length of each wall to facilitate raising the jack frame 6 as the building wall progresses. After the jack frames have been raised, their initial movement causes the wedge surfaces 12 and 23 to become disengaged and upon further movement, the wall mold sections 8 and 9 will move upwardly under the influence of the coil springs 24 and after they have been freed from the wall surface of the building which may be concrete or cement C.

In the modified form of the invention shown in Figure 5, the jack frames are generally designated 6*a* and the wall mold sections 5*a*, and as before, the jack frame 6*a* includes upper and lower frame bars 55 and 56 which are connected at one end by a jack frame leg 57 by screws or the like 58. The other jack frame leg 59 is provided with a series of openings 60 which are adapted to aline with openings 61 in the frame bars 55 and 56 for receiving a suitable removable locking pin. The jack frame units 6*a* are connected by inner and outer rails 62 and 63 and similarly by inner and outer upper rails 64 and 65 to hold the frames in equi-distantly spaced apart relation as before. The wall mold sections 5*a* include inner and outer wall mold boards 66 and 67 which are formed of wood and of sufficient width to sustain the weight of the concrete poured therebetween for a pre-determined wall area. In this form of the invention the lowermost wall mold sections 66 and 67 are left in position as the concrete wall C progresses and as the jack frames 6*a* are elevated additional wall mold sections 66 and 67 are moved into place. The jack frames 6*a* are moved vertically as the building wall progresses by the clutch rod structure shown in Figure 3.

In the modification shown in Figure 6 the wall mold sections are generally designated 5*b* and the jack frame likewise generally designated 6*b*. The wall mold sections include wall mold boards 70 of suitable length and width to form opposed walls for pouring the concrete wall C and secured to the mold boards 70 at spaced apart intervals are metal plates 71 by suitable fastening elements such as nails or screws (not shown). Each of the plates 71 is provided with a plurality of laterally extending ears 72 to which is connected the inner ends of pivot links 73. The outer ends of the pivot links are secured to opposed lugs 74 formed on the legs 75 of an inverted U-shaped jack frame 76. Suitable pivot pins are provided for pivotally connecting the links 73 in toggle fashion between the lugs 72 and 74. The inverted U-shaped jack frames 6*b* are each provided with transverse brace bars 77 which are welded or otherwise held in place and are arranged to limit the downward swinging movement. As shown in Figure 6 the jack frame 76 has been lowered to its operative position and the linkage is shown in dotted lines to indicate the relative positions of the links and mold board sections 70 when the jack frames 6*b* are raised. Inner and outer connecting beams 78 and 79 respectively of I-beam section are welded or otherwise secured to the legs 75 of a plurality of jack frames 76 to hold the same in equidistantly spaced apart relation as pointed out in connection with the form of the invention shown in Figures 1 to 4 and 5.

In the modified form of the invention shown in Figures 7 to 11 inclusive, a double concrete wall mold structure is shown, and as before includes a pair of inner mold boards 80 and a pair of outer mold boards or sections 81. The mold board sections 80 are provided with a series of equidistantly spaced wedge-shaped blocks 82 and similarly, the outer wall mold board sections 81 are provided with a series of equidistantly spaced wedge-shaped blocks 83. The inclined faces of the wedge blocks 82 and 83 are similar to those shown in Figures 1 to 4 inclusive and it is intended to provide a series of jack frames generally designated 6*c* which are similar to those shown in Figures 1 to 4, except that they are intended to accommodate double wall building constructions. Each of the jack frames 6*c* includes vertical frame bars 84, 85 and 86 connected at their top by a horizontal cross bar 87 by means of fasteners 88, and similarly, said vertical frame bars 84 to 86 are connected intermediate their lengths by a horizontal cross bar 89 by means of fasteners 90. The jack frames 6*c* are adapted to be connected together in the same manner as previously described and the lower ends 91 and 92 of the vertical frame bars 84 and 86 are

provided with inclined surfaces **93** and **94** respectively which are adapted to provide mutually engaging wedge surfaces with the inclined surfaces of the wedge blocks **83**. The intermediate vertical frame bar **85** is tapered as at **95** to provide inclined wedge surfaces **96** which are adapted to cooperate with the wedge blocks **82** and provide mutually engaging wedge surfaces.

In constructing a double wall concrete building with concrete walls C′ and C″, the operation is much the same as previously described, and when it is desired to form openings for doors or the like as at **97** in the concrete walls outline strips **98** are nailed transversely to the inner wall mold sections **80** by nails **99** so that their heads protrude from the strip and will become embedded in the concrete walls C′ and C″. To these strips are affixed bulkhead strips **100** having angle portions **101** which engage one edge of the strip **98** as shown in Figure 7. The bulkhead strips **100** prevent the concrete during pouring from flowing to the portions **97** of the mold. After the wall has been poured, and the mold boards **80** and **81** removed by displacing the jack frames **6***c*, the molding strips **98** are retained in place and the angle portion **101** forms a recess for receiving a sealing plate **103** formed of metal or other material. Over this is then placed a felt sealing strip **104**, and finally, wood frame members **105** are temporarily secured in place by nails **106** (Fig. 8). Thus, the space between the walls C′ and C″ will be completely sealed in the area of window openings **97**.

Referring in detail to Figures 13, 14 and 15, there is shown a slightly modified jacking frame which is indicated by the numeral **107**. The jacking frame **107** has substantially the same purpose and construction as the previously-described jacking frame **6**, and the jacking frame **107** may be made of metal. The jacking frame **107** includes a pair of spaced, parallel, horizontally disposed top bars **108**, and arranged below the top bars **108** is a pair of spaced, parallel, longitudinally extending bottom bars **109**. A plurality of vertically disposed, spaced, parallel side pieces **110** extend between the top and bottom bars **108** and **109** and are secured thereto, as by welding. Horizontally disposed top pieces **111** extend between the pair of top bars **108** and are secured thereto.

The jacking frame **107** further includes a plurality of legs **114** which are each provided with an inclined surface **115** that serves the same purpose as the previously described inclined surface **23** on the legs **18**. The legs **114** are maintained in their proper positions by means of U-bolts **113**, and the U-bolts **113** extend through openings **112** and the side pieces **110** and also through registering openings **118** in the bars **108** and **109**. Extending between the bottom bars **109** and secured thereto, as by welding, are horizontally disposed, spaced parallel bottom pieces **117**, and certain of these bottom pieces **117** serve to support U-bolts or hitches **116**. The U-bolts **116** are adapted to be connected to a block-and-tackle **50**, whereby the jacking frame **107** can be elevated by pulling on the cable **52**.

In the design illustrated in Figures 16 and 17 the jack form, which is formed of horizontally disposed frame bars **120** with vertically disposed legs **121** is provided with toggle acting cams **122**, which are substantially semi-circular shaped, and these cams are mounted on pins **123** whereby upon upward movement of the jack form, from the position shown in Figure 16 whereby the form **125** is positioned to receive the concrete as the wall is poured. After the wall sets the jack form is released by drawing the form upwardly and actuating the cams as described.

In the design illustrated in Figures 18 and 19 the jack forms, which are provided with horizontally disposed bars **127** and vertical legs **128** are provided with rollers or balls **129** which are resiliently held by springs **130**, and the legs **128** are provided with stop bars **131** which limits upward movement of the rollers, and recesses **132** that are positioned to receive the rollers upon upward movement of the jack forms in releasing the forms from the concrete wall or the like.

In this design the form boards **133** are provided with cleats **134** against which the rollers are positioned and as the jack form is elevated the legs **128** travel upwardly with the rollers **129** rolling into the recesses **132** whereby the form boards **133** with the cleats **134** thereon are released from the wall which in this design, is indicated by the numeral **135**.

As illustrated in Figure 20 the jack forms having horizontally disposed members **136** and **137** may be provided with reinforcing racks having vertical legs **138** and **139** with cross members **140** at the upper ends for supporting reinforcing rods **141** and the legs **138** and **139** may be supported with cross bars **142**.

By this means the reinforcing rods are freely supported and at the same time are retained in position as the wall is continued upwardly with the jack form being moved accordingly.

The horizontal members **136** and **137** of the jack form shown in Figure 20 are supported by vertical members **143** corresponding to the members **18** shown in Figure 2.

This application represents an application which is copending with Serial No. 216,954, filed March 22, 1951, for Wall Construction Apparatus, and there is a further copending application No. 254,291, filed November 1, 1951.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred embodiments thereof, and that various changes in the shape, size and arrangement of the parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a concrete mold, inner and outer mold sections, inverted elongated jack frames arranged to straddle said sections, and toggle links connecting said mold sections to the legs of said jack frames, said jack frames being connected one to the other in spaced apart relation, said jack frames each including an outer leg, and frame bars projecting beyond said outer leg, a gauge frame bar connected to said frame bars, and gauge arms connected to the lower ends of the gauge frame bars.

2. In a movable longitudinal support structure, top bars, bottom bars arranged below said top bars, means including side pieces connecting said top and bottom bars together, legs extending along said top and bottom bars, and means connecting said legs to said bars, said last named means embodying a plurality of securing elements, said legs being each provided with an inclined surface, bottom pieces extending between said bottom bars and secured thereto, and securing elements supported on said bottom pieces and defining a hitch.

3. In a mold, movable longitudinal support structures, means maintaining said movable longitudinal support structures in alignment and connected one to the other, form boards arranged in opposed relation with respect to each other for receiving therebetween the material being poured, spring means connecting said form boards to said movable longitudinal support structures, and means releasing the boards when the movable longitudinal support structures are raised.

4. In a mold, movable longitudinal support structures, means maintaining said movable longitudinal support structures in alignment and connected one to the other, means for adjusting said support structures, a pair of spaced apart movable longitudinal mold sections, and spring means yieldably connecting said mold sections to said movable longitudinal support structures whereby the mold sections are maintained stationary until the movable longitudinal support structures are raised and whereby raising of the movable longitudinal support structures causes the mold sections to be released.

References Cited in the file of this patent

UNITED STATES PATENTS

699,625	Lancaster	May 6, 1902
947,160	Newerf	Jan. 18, 1910
965,805	Frost	July 26, 1910
1,041,991	Frost	Oct. 22, 1912
1,240,436	Gendon et al.	Sept. 18, 1917
1,511,087	McKenna	Oct. 7, 1924
1,810,777	McKee	June 16, 1931

FOREIGN PATENTS

915,187	France	Oct. 29, 1946
968,634	France	May 3, 1950