March 22, 1927. E. WATSON 1,622,072

FORM HOLDER FOR CONCRETE WALLS

Filed May 26. 1925

Fig. 1.

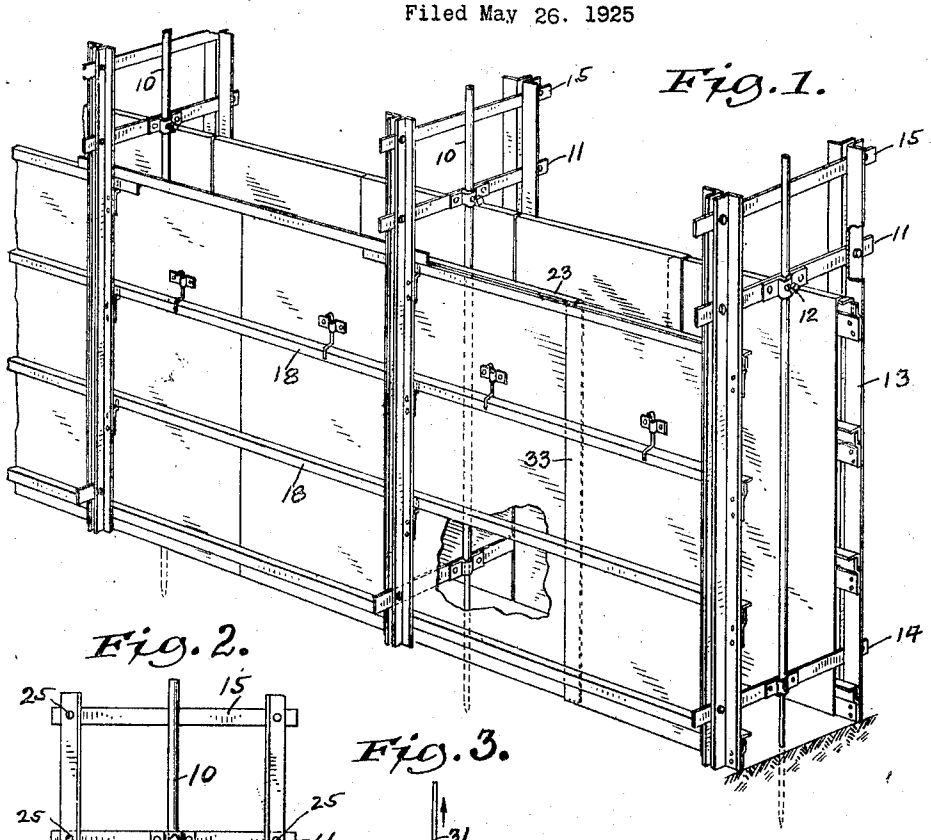


Fig. 2.

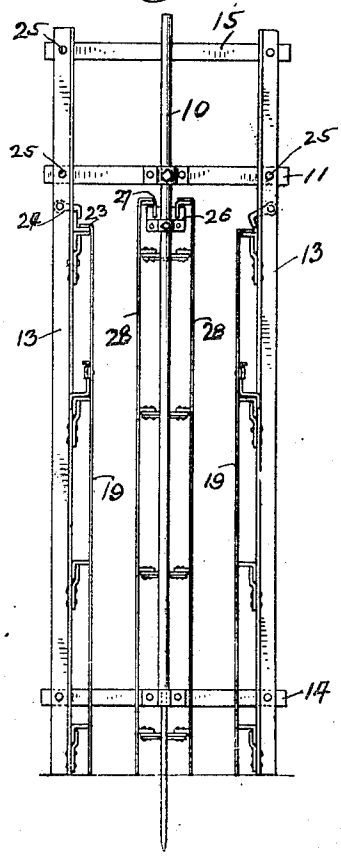


Fig. 3.

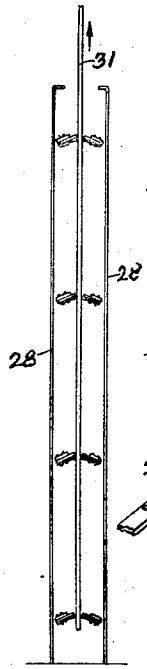


Fig. 4.

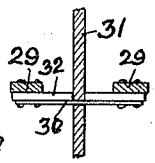


Fig. 7.

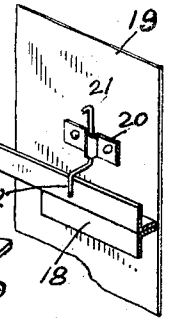


Fig. 6.

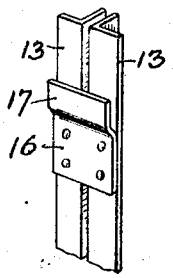
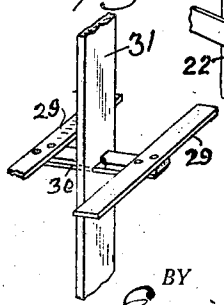


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FORM HOLDER FOR CONCRETE WALLS.

Application filed May 26, 1925. Serial No. 32,910.

My invention relates to an improved form holder for concrete wall construction, which is exceedingly simple in design, and which by reason of its knock-down characteristics is readily portable for convenient transportation from place to place and at the same time is economical in point of space required for storage when not in use.

The invention resides in a frame comprised of two vertical guides or uprights which are tied together at top and bottom to maintain their parallelism and separation a distance equal to the thickness of the wall to be cast. These guides or uprights, or frames which they compose, are intended to be transversely positioned at a given distance apart in the length of the wall, and are adapted to support at their inner opposite sides a plurality of longitudinally extending bars, arranged one over another, upon which bars may be supported the flat metal forms or plates which define the wall formation.

The longitudinal bars preferably are all of the same length as a matter of convenience in several particulars, and the metal forms or plates are preferably all of the same width for like reasons. If the length of the wall be such that the length of the longitudinal bars cannot be evenly divided thereunto, the longitudinal bars may overlap for a portion of their length, and thus be arranged so as to support the metal forms in the desired position. It is preferable that the metal forms or plates be a multiple of the length of the longitudinal bars. In case the number of the forms or plates used in a given line does not divide evenly into the length of the wall surface, the plates may be made to overlap at their vertical margins, and so compose the required length of wall-forming surface.

By reason of the provisions for adjustment described, a form holder for any length of wall may be set up instantly, and without the requirement for special fittings as in case where the standard forms do not have capability of adjustment, but require special or irregular forms to complete the setting for casting a wall having a length into which the length of the form cannot be evenly divided.

The frame which constitutes the basic means for enabling the forms to be sustained in position, may be variously supported during the casting of the wall. The upper tie or cross bar from which the uprights depend may be supported upon a post or standard, the latter being set centrally with respect to the wall, or the frames may themselves rest at the bottom of the trench during the casting of the first layer of the wall construction, and thereafter the frame may be supported by the lower tie or cross bar resting upon the top of the previously formed section of the wall, during subsequent casting.

The forms themselves have the shape of metal plates, and are adapted to be suspended in vertical position upon and be supported by the longitudinal bars. These plates may be arranged in such succession as to define the surface of the wall of given length.

When the central post or standard is used to support the frame, the upper cross arm to which the vertical guides are connected is adapted to be adjusted vertically upon the post or standard, with the increase of the height of the wall, so that when one section is finished, the apparatus may be readily adjusted to permit the formation of a superposed section.

The invention embodies other details of construction which will be hereinafter described, and the novelty of the whole will be pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a perspective view of an assembled form holder, in accordance with my invention, arranged for the production of a solid concrete wall.

Fig. 2 is an end view showing the arrangement of Fig. 1, but showing also an interposed means for the purposes of constructing a hollow wall.

Fig. 3 is an end view showing the means whereby the inside form holder in a hollow wall construction may be removed so as to permit withdrawal of the inner forms.

Fig. 4 is an enlarged sectional view of a part of the construction shown in Fig. 2.

Fig. 5 is a perspective view of the same parts.

Fig. 6 is a perspective view of a section of one of the vertical guides and showing the means for supporting the longitudinal bars thereon.

Fig. 7 is a perspective view showing the manner in which the plates constituting the forms are supported upon the longitudinal bars.

In the drawing, the numerals 10 indicate

a plurality of posts or standards, the lower ends of which are set in central alignment in the bottom of the trench. These posts may be in the form of single rods, but are preferably in the form of tubes through which a rod is passed with its point set in the ground at the bottom of the trench.

Cross bars 11 are provided at a point intermediate their ends with an eye in which is received the post or standard 10. A set screw 12 threaded into the cross bar is adapted to hold the cross bar in adjusted vertical position upon the post or standard 10.

At their opposite ends the cross bars support vertical guides 13 near their upper ends, so that such guides depend from the cross bars. A lower cross bar 14 embraces the post but is not clamped thereto. The said lower cross bar is attached at its outer ends to the vertical guides near the lower ends of the latter, so that such guides are maintained rigidly in parallel position.

The structure may be stabilized by providing a third cross bar 15 which is attached to the vertical guides at their extreme upper ends.

In order that the vertical guides may possess the necessary rigidity and resist the outward pressure of the concrete while the latter is setting, such vertical guides are conveniently formed as angle irons and are arranged in pairs, slightly separated, as shown in Fig. 6, and united by plates 16, the latter being riveted to the parallel flanges of the said guides.

The plates 16 are extended outwardly at their upper ends away from the vertical guides 13, as shown at 17, Fig. 6, so as to form the pockets in which may be received one flange of the angle irons forming the longitudinal bars 18.

In Fig. 1 I have shown three sets of the frame-like supports as described. When these are positioned, the longitudinal bars 18 are passed therein and retained by the vertical flanges of the bars resting in the pockets formed between the off-set ends of the plates 16 and the guides 13. The assembly is shown in Figs. 1 and 2. The forms themselves may be metal plates 19 of suitable length and width. Each plate has fastened to its rear side an eye 20 in which is swiveled a latch 21, the point 22 of which is designed to engage the outer side of the longitudinal bar, and maintain the plate in vertical position. The longitudinal bars 18 will be in such number as will brace the plates 19 against undue deflection by the concrete when the pouring takes place. If desired, the forms or plates 19 may be flanged outwardly at their upper ends as shown at 23 in Figs. 1 and 2, and the flanges may rest upon the upper one of the longitudinal bars. In cases where the distance from the end of the longitudinal bar last put in place and the end of the wall is less than the length of the bars, which ordinarily will have the same length, the upper longitudinal bar 18 may have imposed thereon so as to overlie for a portion of its length, another angle iron in reversed order, such other bar being retained in position by catches 24 pivoted in the space between the pairs of vertical guides 13. The upper cross bar 11, the lower bar 14 and the third cross bar 15 are arranged with their ends in the spaces separating the pair of guides 13, and connection of these parts is made by means of pins 25 passing through perforations in the ends of the cross bars and registering perforations in the laterally extending flanges of the vertical guides. The lower cross bar 14 acts merely as a tie bar, and it may be a strip of metal, but a wire will answer the same purpose. Such tie bar is embedded in the concrete structure. The third cross bar 15 acts as a distance piece between the oppositely arranged guides 13, and is formed as a strip of metal sufficiently heavy to prevent buckling under the strains imposed thereon in the introduction of the mixture into the molds. The third cross bar 15 acts as a distance piece between the opposite guides 13.

In case it is desired to make a hollow or double wall, an auxiliary form holder is arranged intermediately as shown in Fig. 2. To permit this plan to be carried out, a clamp 26 is attached to the post just below the cross bar 11, vertically extending transverse notches at the ends of the clamp receiving the lower flanges of a pair of longitudinal bars 27. The forms or plates 28, having flanges at their upper ends and supported by that means on the bars 27, are arranged as shown in Fig. 2, these forms or plates being held in separated position by means of longitudinal bars 29, connected by flexible members which pass through the vertical strips 31, so that when the flexible members 30 are straight, as shown in Figs. 2, 4 and 5, the forms or plates 28 will be held against deflection by the concrete. After the wall has set, the pins connecting the lower cross bar 14 to the lower ends of the guides 13, are withdrawn. At the same time the vertical strips 31 are lifted so as to deflect the flexible strips 30 into the position shown in Fig. 3. The forms or plates 28 may then be withdrawn, inasmuch as the pressure is released. The forms or plates 19 may likewise be withdrawn upon removing the pins connecting the third cross bar 15 to the upper ends of the guides 13, so that the latter may pivot away from the wall on the pins connecting them to the cross bar 11. The cross bars 11 may be moved vertically on the posts or standards 10 to another position, after which the as-

sembly of the forms will be made as before.

The fact that the forms or plates 19 and 28 are independent, permits their ready arrangement lengthwise of the bars 18 and 27 to define the surfaces of the wall or walls. In case the width of the separate plates is not the multiple of the length of the wall, the situation may be met by overlapping the edges of adjacent plates as indicated at 33, in Fig. 1.

The guides or uprights 13 and the several cross bars constitute a frame upon which the form holders, through the longitudinal bars 18, are supported. It is not necessary in all cases that this frame be supported upon a central post or standard, inasmuch as the several frames, properly aligned, may rest at the bottom of the trench during the operation of casting the first layer of the wall. After disconnecting the lower cross bar 14 from the guides or uprights 13, the frame may be raised and a new cross bar 14 inserted and connected, and the forms or plates arranged for another casting operation. When positioned for the second and subsequent casting operations in the height of the wall, the extreme lower ends of each set of the guides or uprights 13 will embrace the upper sides of the last cast section of the wall, with the newly placed cross bar 14 resting thereon, and so position the form holder for the next casting operation.

The important feature of the invention resides in its extreme mobility. Its capacity for quick adaptability to meet the requirements of walls of different length by a simple adjustment of the longitudinal bars 18 and the forms or plates 19, irrespective of the length and width of those parts, permits its immediate installation under all conditions of its use. To disassemble, requires only that the pins 25 connecting the guides or uprights 13 to the cross bars, be withdrawn. The elements of the form holder are free from substantial lateral projections, and may be bundled into a small space for convenient transportation and storage.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. A form holder for concrete work, comprising a central standard, a cross bar and depending parallel guides supported thereon, bars arranged longitudinally with relation to the said guides and supported removably thereon, and forms for the surfaces of the wall adjustably arranged on said longitudinal bars.

2. A form holder for concrete wall construction, comprising a central post, a cross bar adjustable vertically thereon, guides depending from the ends of the cross bar and supported at their upper ends on the cross bar, means for tying the lower ends of the guides to maintain parallelism, longitudinal bars supported removably on the guides, and forms for the surfaces of the walls adjustably arranged on the said longitudinal bars.

3. A form holder for concrete wall construction, comprising a central post, a cross bar adjustable vertically thereon, depending guides supported at their upper ends upon the cross bar, the said guides each being constituted as a pair of spaced angle irons, between which the ends of the cross bar are pivoted, means for holding the guides in parallelism, longitudinal bars supported removably on the said guides, and forms for the surfaces of the wall adjustably arranged on the said longitudinal bars.

4. A form holder for concrete wall construction, comprising a central post, a cross bar at the upper end thereof, depending guides supported at their upper ends upon the cross bar, longitudinal bars associated with the guides, means on the latter for removably supporting the said bars, means at the lower end of the guides for maintaining parallelism of the guides, and forms for the surfaces of the walls supported in adjustable position upon the said longitudinal bars.

5. A form holder for concrete wall construction, comprising a frame composed of uprights or guides and cross bars connecting the same to maintain parallelism of the said uprights or guides, longitudinal bars removably supported on the said uprights or guides, and removable forms for the outer surfaces of the wall supported for longitudinal adjustment upon the said longitudinal bars.

6. A form holder for concrete wall construction, comprising a frame composed of uprights or guides and cross bars connecting the same to maintain parallelism of the said uprights or guides, longitudinal bars associated with the uprights or guides at their opposed inner faces, means on the guides or uprights for removably supporting the said longitudinal bars, and forms for the outer surfaces of the wall removably supported for longitudinal adjustment upon the said longitudinal bars.

7. A form holder for concrete wall construction, comprising a frame composed of uprights or guides each formed of spaced angle irons and connected by plates attached to their flanges lying in the same plane, and upper cross bar having its ends entered into the spaces between the angle irons and pivoted thereto, means for connecting the lower ends of the uprights or guides to maintain parallelism of the latter, longitudinal bars removably supported upon the uprights or guides, and forms for the outer surfaces of the wall removably supported upon the said longitudinal bars.

8. A form holder for concrete wall construction, comprising a frame composed of uprights or guides, cross bars connecting the said uprights or guides to maintain their parallelism, bars removably supported upon the uprights or guides and adjustable longitudinally to adapt the form holder to walls of different length, and forms for the outer surfaces of the wall removably supported for longitudinal adjustment upon the said longitudinal bars.

9. A form holder for hollow concrete wall construction, comprising a central post, a cross bar supported thereon, guides depending from the ends of the cross bar, means for maintaining parallelism of the guides, longitudinal bars supported removably upon the guides, forms for the outer surfaces of the wall supported for longitudinal adjustment on the said bars, and a collapsible form supported by the central post intermediate the outer forms for forming the hollow in the wall.

In testimony whereof, I have signed my name at Milwaukee, this 23rd day of May, 1925.

ERNEST WATSON.