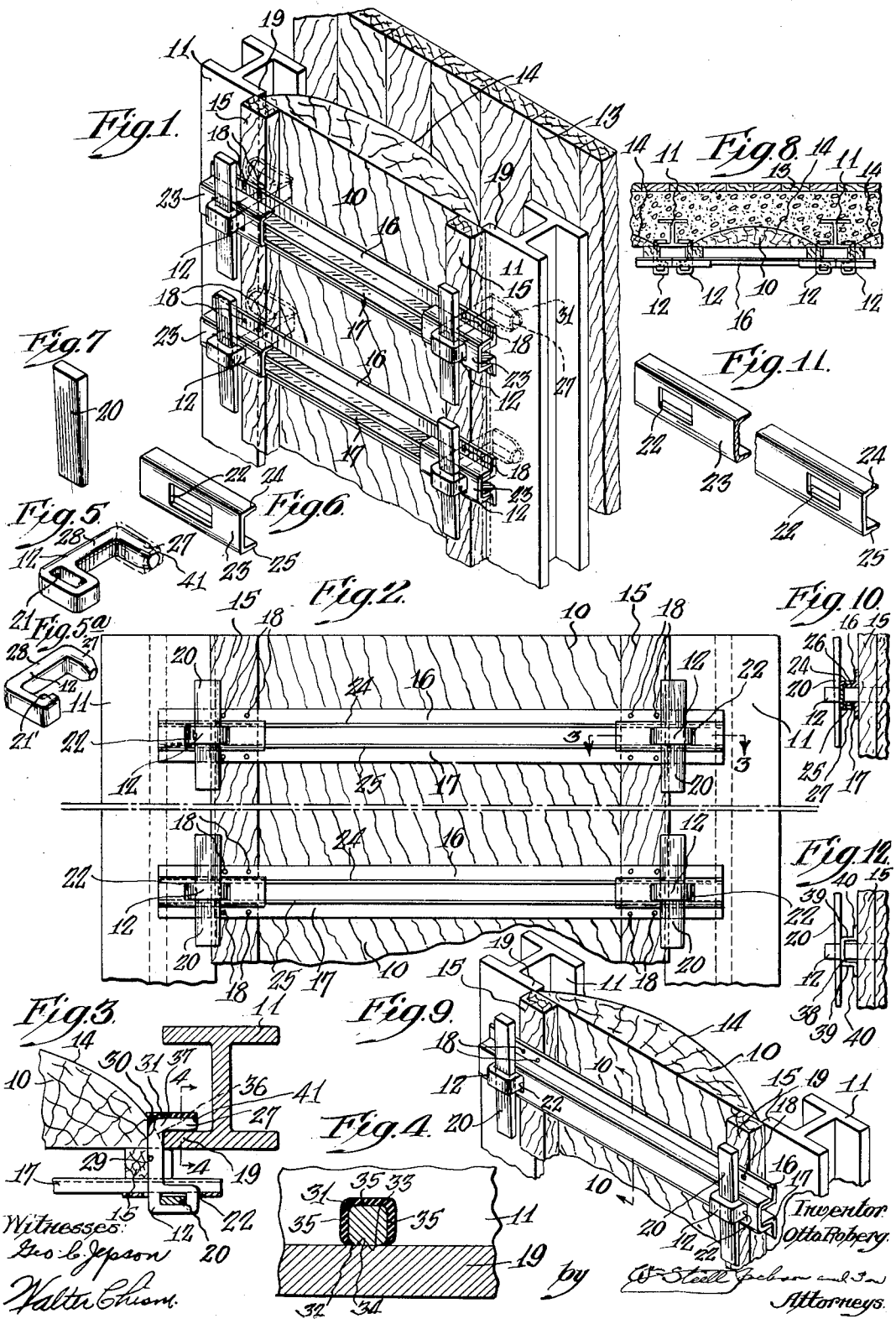
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CONCRETE MOLD CONSTRUCTION

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CONCRETE MOLD CONSTRUCTION

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My invention relates to concrete construction with more particular reference to forms between spaced flanges of successive structural members, the forms to be used over and over again at different portions of the construction.

The main purpose of my invention is to employ a clamp for detachably securing a molding form to stationary supports of a permanent structure.

A further purpose is to provide a clamp having lateral extensions for holding a form in place against a permanent structure, engaging the lateral extensions beneath the flanges of the permanent structure.

A further purpose is to provide a clamp having a lateral extension at one end for holding a form in place against a permanent structure and having an opening at its opposite end for receiving a wedge.

A further purpose is to construct a clamp adapted to hold a form in place adjacent a permanent upright and which is also insertible between angle iron spans of the form to position the clamp adjacent the upright.

A further purpose is to tighten a clamp in position by channels and wedges beneath the span and to detach the clamp from within the concrete form and from engagement with the permanent structure by releasing pressure upon the span to allow easy removal of the clamp.

A further purpose is to construct a one piece clamp to support a temporary form which is provided at one end with a lateral extension adapted to engage a permanent structure and at the other end with the aperture for receiving wedges.

A further purpose is to provide metallic spans between vertical braces of a concrete form, the central portion of the metallic span having openings to allow a clamp to be passed through it.

A further purpose is to introduce between concrete and a removable rigid structure imbedded in the concrete a layer of resilient material to permit withdrawal of the rigid structure without marring the concrete.

A further purpose is to place a slitted rubber sleeve about a lateral extension, the slitted portion allowing the lateral extension of the clamp to engage the permanent support and at the same time enabling the rubber sleeve to come in contact with the concrete, thereby preventing cracking or marring of the concrete, which will have set before the clamp is detached from the permanent structure, during removal of the form.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate my invention by one general form only, with slight variations of parts, selecting a form which is simple in construction, practical in use and inexpensive to manufacture and which at the same time well illustrates the principles involved.

Figure 1 is a fragmentary perspective view of a removable mold held in place against a permanent structure by my improved clamp.

Figure 2 is a fragmentary front elevation of a mold, permanent structure and clamp seen in Figure 1.

Figure 3 is a fragmentary sectional plan view taken on the line 3—3 of Figure 2.

Figure 4 is an enlarged fragmentary transverse section taken on the line 4—4 of Figure 3.

Figure 5 is a perspective view of my improved clamp.

Figure 5a is a view similar to Figure 5 but omitting part of the material which closes the eye in Figure 5.

Figure 6 is a perspective view of one of the channel members used in my construction.

Figure 7 is a perspective view of a wedge used in holding my improved clamp in place.

Figure 8 is a top plan view of the structure seen in Figure 1, but showing the concrete formed in place between the removable mold and the supporting timbers.

Figure 9 is a fragmentary perspective view similar to Figure 1 but with the channel irons spanning the mold from end to end.

Figure 10 is a transverse sectional view taken on the line 10—10 of Figure 9.

Fig. 11 is a fragmentary perspective view of the channel used in Figures 9 and 10.

Figure 12 is a view similar to Figure 10 but showing a different formation of the span.

Like numerals refer to like parts in all figures.

Describing in illustration and not in limitation and referring to the drawing:

In the past, when it has been desired to build concrete foundations, walls, etc., the usual procedure has been to secure the forms for the concrete to upright permanent I-beams, allowing the edges of the forms to be alined flush with the outer surface of the I-beams.

After the forms have been set to place, adjacent the I-beams, a bolt with a threaded end has been inserted from the rear of the form and through the form, projecting outwardly to receive a nut. The opposite end of the bolt has carried a laterally projecting end which has engaged the inner portion of the flange of the I-beam.

In using the above construction, the slack between the form and the permanent structure has been taken up by tightening the nut on the bolt. This assemblage is a difficult one to arrange as it requires one man to work from behind the form to insert a bolt and locate the laterally projecting end in its proper position behind the flange of the I-beam, and another man to place and tighten up the nut upon the bolt to take up the slack. In many installations the man behind the form does

not have enough room to work properly. Vibrators are often used to shake the concrete and cause it to settle, and, as the vibration takes place, the bolts frequently are dislodged from their proper place. Furthermore, the vibration and the weight of the concrete also cause bending of the bolts which is very objectionable.

Removal of the bolts after hardening of the concrete inevitably causes marring and cracking of the concrete, and this is particularly so when the bolts are bent. Much time has been wasted by the necessity of plastering up these marred or cracked places and my invention is directed to overcoming the objections noted above, and to reducing the time required to install and remove the forms.

My invention will assume many variations as to shapes and arrangements and the illustrations disclosed are intended to be a few only of the many that I believe to be possible under my invention.

In Figure 1 I have shown a mold form 10 held in place against permanent steel structure, desirably comprising stationary I-beams 11, by my clamp 12 to determine the shape of the front surface of the concrete. In the figures, vertically disposed timbers 13 are used for the rear wall of the mold, and it is possible to pour concrete around the rear of the I-beams and between the mold 10 and the timbers 13.

In the installation shown, the I-beams extend indefinitely in a row from start to finish of the structure and it will be understood that many forms are fastened in place to receive the poured concrete. The conditions between the two I-beams shown are typical and recur throughout the structure.

After the concrete has hardened, or set, the forms are removed and fastened side by side further along the line of work. The mold form 10 is provided with a curved surface 14 intended to reduce the mold capacity and add finish to the work. The form 10 carries vertical braces 15 at its ends which overlap the I-beams and are adapted to engage horizontally disposed angle irons 16 and 17. The angle irons 16 and 17 are secured to the braces 15 by nails 18 or by any desired fastening.

Preliminary to placing the angle irons 16 and 17, as described above, the end of the clamp 12 is inserted behind the flange 19 of the I-beam 11. After the angle irons 16 and 17 are located, the clamp 12 is forced outwardly by the insertion of a wedge 20 through an opening 21 in the rear end of the clamp 12 and through an opening 22 in the channel member 23.

The flanges 24 and 25 of the channel engage the flanges 26 and 27 of the angle irons 16 and 17, causing the mold form to be drawn firmly against and flush with the edge of the I-beam flange 19. If required, the form 10 may be suitably notched to assist in introducing the ends of the clamp.

I prefer to employ a clamp such as is shown in Figure 5 which is provided with a lateral extension 27 at its forward end and with an opening 21 at its rear end, the opening 21 being adapted to receive the wedge 20.

The structure of Figure 5*a* omits part of the wall of the opening of Figure 5 so as to make the C clamp more nearly the conventional C than in Figure 5 in that the transversely extending rear end is provided with a short projection 21' which holds the wedge against lateral movement but is not provided with the remaining closure shown in Figure 5.

In the form of wedge shown in Figure 5, the recess 21 allows easy insertion or removal of the clamp from behind the I-beam 19.

The rearwardly extending portion 28 of the clamp fits into three openings, 22 in the channel, 29 in the vertical brace member and 30 in the mold, respectively, thereby allowing the portion 28 to fit flush against the edge of the flange 19 of the I-beam to firmly secure the mold in place adjacent the vertical I-beams.

The inner hooked end 27 of the clamp is provided with a sleeve 31 of rubber or other resilient material, slitted at 32. This sleeve expands when it is placed about the extension 27 and allows the outer face 33 of the extension to engage the inner face 34 of the flange of the I-beam. At the same time, the rubber covers the remaining portion 35 of the hooked end and the rubber is exposed to the concrete when the latter is poured into the mold.

The rubber sleeve is preferably cut angularly at its end 36 at a point where the bend 37 takes place on the inwardly extending portion of the clamp.

In the illustration of Figure 1 I have shown the channel of short length. I find in some construction work it is desirable to have the channel of short length when there is not a large amount of concrete to be poured into the form and when, for this reason, the weight of the concrete against the form will not be great.

In Figures 9 to 11 I have shown a variation in the length of the channel and in this form the channel runs the full length of the angle irons ("angles"), preferably registering flush with the ends of the angles which span the outer surfaces of the mold. This construction I find to be more desirable when a heavy wall is being formed than for the lighter walls, as it will be obvious that more strength will be added to the form than in the structure of Figure 1.

In Figure 12, I have shown a variation of the span in which the channel and angles are combined. In this a body 38 carries inwardly directed flanges 39 integral with outwardly directed flanges 40. This construction is quite desirable as it reduces the number of parts handled from three to one, when the span is placed on the mold. This form is particularly desirable when the weight of the wall is intermediate those of the forms shown in Figures 1 and 9.

When the concrete has been formed in the mold and about the clamp and it is desired to remove the mold, the nails are withdrawn and the wedges are knocked out. As this is done the hooked end will be dislodged from engagement of the flange and at the same time will be drawn outwardly until the clamp is detached from the mold and concrete structure. The mold may then be lifted out bodily, or, if preferred, the mold may be taken down from its place and the clamp removed from behind the I-beam after the mold has been taken away.

By placing rubber or other compressible material upon the extension, marring of the hardened concrete will be reduced to a minimum. To further insure safe withdrawal of the extended end of the clamp from the concrete, I angularly cut the end 41 of the hook extension.

It will be evident that the entire form of my invention may be assembled from the front, without entering the mold space, and that the clamp may be inserted very simply, by a combination of angular swinging about a vertical axis along the edge of the I-beam flange and longitudinal move-

ment toward the form. Withdrawal of the clamp is accomplished by the reverse of this process.

While my clamp is best suited to lateral attachment of a vertical form to vertical permanent structure, it may also be used for horizontal attachment of a vertical form to horizontal permanent structure, or to attachment of a horizontal form to horizontal or to vertical structure. The capability of the clamp to engage the reverse side of the flange of an I-beam, H- beam, channel, etc., is made use of in all cases. Where the permanent structure does not contain readily accessible flanges, special flange gripping surfaces for my clamps may be provided.

I find that tightening of the clamp by pressure exerted between the clamp with its wedge and the form is much superior to tightening of the clamp by varying the clamp length as has been the prior practice in cases of bolts, since the clamp is not twisted torsionally and can be held against turning by the walls of the channel openings. Since the hook extensions of the clamp are relatively short, the component of the tension upon the clamp which tends to bend the hook acts through a lever arm, and there is little likelihood of bending the hook into an obtuse angle.

It is to be noted that the form itself tends to prevent the hook extension from slipping bodily out of engagement beneath the flange of the permanent structure, since the notches in the temporary structure will preferably be made small enough so that their walls assist in maintaining the clamp position as set.

The space between the angles assists in centralizing the angle positions, with respect to the vertical axis of the form, and the opening in the channel also assists in this centralization. Extension of the ends of the angles on either side of the clamp is not undesirable, since the angles of the adjoining forms on either side need not be on the same vertical level as those in the form illustrated, but may desirably, be either above or below those shown.

I find that the introduction of compressible material between the hook extension and the hardened concrete is advantageous as it permits lateral play in withdrawing the hook extension, so that the pulling and turning of the hook extension during withdrawal is not as likely to break out portions of the wall.

I regard it as entirely immaterial whether the rubber sleeve is removed with the clamp or whether it remains permanently in the concrete. Where, as is common in installations in which the surface of the wall is to be visible after completion, the opening left by the hook extension is to be filled with concrete, the process of filling is much simplified because of the avoidance of cracks made possible by use of the rubber.

I prefer to use a rubber sleeve but I wish to have it clearly understood that other compressible materials may be used such for instance as paper or other fibrous materials. Rubber, however, is preferable because it is not subject to any disintegration due to the alkaline condition found present in concrete and to the moisture.

It will be noted that the clamp member is effectively a C clamp whose front end is a transversely hook member and whose rear end is a transversely wedge receiving member which may conveniently be partly enclosed toward the front end to prevent lateral slipping of the wedge.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a mold that is intermediate spaced flanges of vertical structural members, a form, rails, hooks, pairs of cooperating angles, shoes and wedges, the form being intermediate the flanges, the rails fastening to the outside of the form along and adjacent to the flanges and laterally overlapping the flanges and having recesses at intervals to pass the outer portions of the hooks, the hooks having inner and outer hook ends directed laterally away from the form, the body portions of the hooks being located in the recesses and the inner hook ends overlapping the inside of the flanges, the cooperating angles of each pair extending from rail to rail across the rails and having their inner flat faces fastened to the rails and their outwardly extending faces adjacent opposite sides of the body portions of the hooks, the shoes comprising inwardly directed channel portions, the body of the channel perforated to pass a hook and the inwardly extending sides of the channel enclosing between them the outwardly extending faces of the angles adjacent opposite sides of the hook and the wedges supporting the shoe between the outer hook ends of the hooks and the shoes.

2. Structure in accord with claim 1 characterized by rubber shields over the said inner hook ends at the portion thereof exposed to the wet concrete and open along the ends to permit direct engagement between the ends and flanges.

3. In a mold that includes permanent structure and a form, the combination of a clamp for securing the structure and form together engaging the outside of the form and having a hook end extending into the mold to engage an inside surface of the said structure and a rubber cover for the said end open longitudinally to permit direct engagement between the said end and the said surface.

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