May 31, 1955 R. L. OTTI 2,709,292

CLAMP FOR CONCRETE FORMS

Filed Sept. 6, 1951

Fig. 1

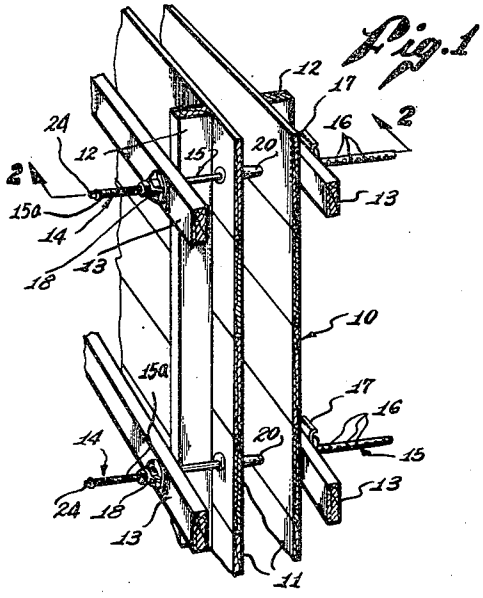


Fig. 3

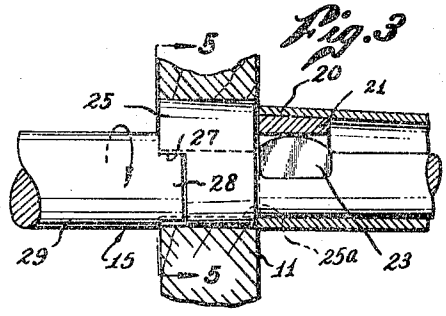


Fig. 4

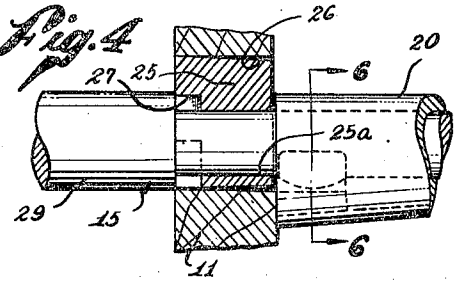


Fig. 2

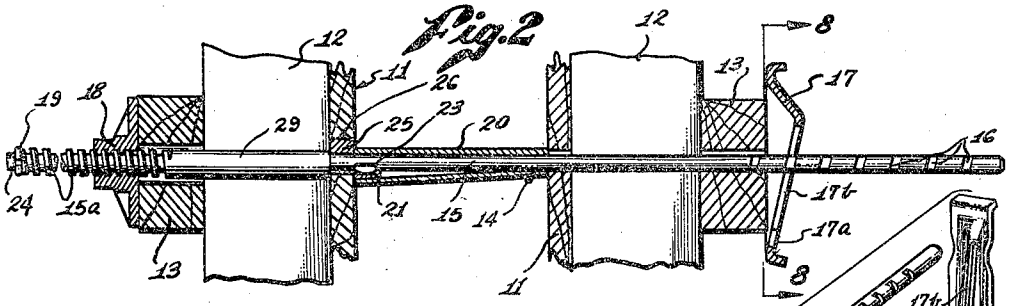


Fig. 5

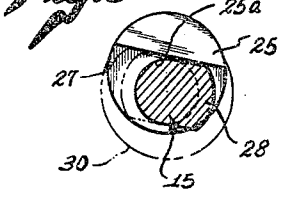


Fig. 7

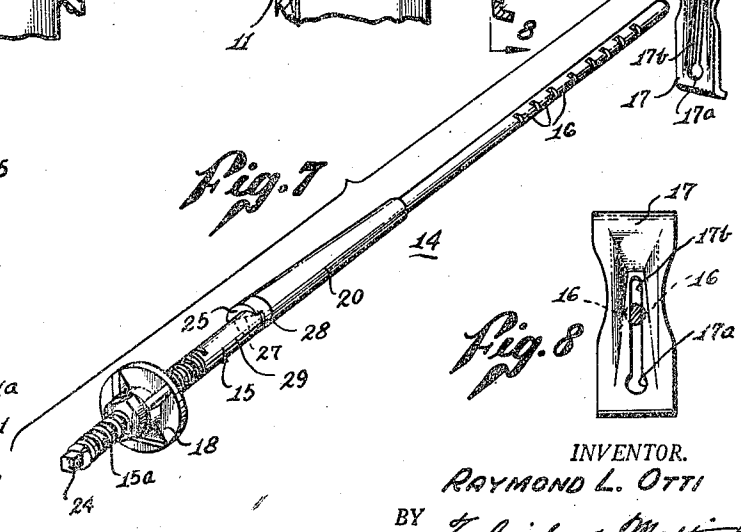


Fig. 6

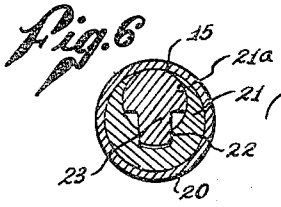


Fig. 8

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CLAMP FOR CONCRETE FORMS

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14 Claims. (Cl. 25—131)

My invention relates generally to the construction of forms for the pouring of concrete walls, columns, and similar structures, and more particularly to a clamp employed to hold the opposite walls of the form in appropriate relationship during the pouring of the concrete.

It is the usual practice in constructing walls of concrete to erect parallel, spaced, wooden form walls, and to interconnect such form walls with tension members to prevent them from bulging apart due to the hydrostatic pressure of the concrete contained within the wall. The interconnecting tension members just described are usually allowed to remain in the wall after the concrete has set.

It is not only desirable that the members used to interconnect the opposite form walls be capable of withstanding the tension of outward forces tending to bulge the walls apart, but also be stiff enough to serve as compressive spacing members so as to maintain an accurate thickness of the finished concrete wall. To accomplish these ends, the tie members are usually constructed of fairly stiff steel rod or bar so as to be able to withstand both the tension due to hydrostatic pressure and other forces which may tend to move the walls together, possibly before the concrete has been poured into the form.

Still another problem arising in connection with the use of ties connected between the form walls is that of assembly. It is desirable to be able to construct the form walls in one continuous operation without interrupting such operation for the insertion of cross ties of the class above described. In other words, the preferred method of constructing the concrete form is to complete the same without any cross ties therein, and thereafter insert the ties where they may be needed, either for their spacing function or tension function. When the wall is on the order of only a few inches thick, say ten to fourteen inches, it is quite obviously highly impractical to gain access to the space between the form walls, particularly if the form wall is of considerable height, and thus it becomes difficult to insert a member which is to abut against the interior surfaces of the form walls and serve to space the same apart, as above described. It is, of course, a relatively simple matter to bore holes through the form walls and insert a simple bolt which will prevent the walls from bulging at that point. A simple bolt will not, however, act in compression to serve the spacing function previously described.

Bearing in mind the foregoing discussion and problems, it is a major object of the present invention to provide a form clamp of the class described which may be inserted in the form walls after the same have been erected.

It is another object of the invention to provide a form clamp insertable as just described which will serve both as a tension member to prevent bulging of the walls and as an abutment member to hold the form walls in accurate spaced relationship.

It is still another object of the invention to provide a device of the character described which is simple and certain in its operation, that is to say, which may be placed

as an abutment between the interior surfaces of the form walls entirely from the outside of the walls with the assurance that a firm spacer is provided.

Yet another object of the invention is to provide a device of the character described which is readily and quickly removable from the form to permit stripping the form after the concrete has set.

A still further object of the invention is to provide a clamp of the class described in which no metal parts need remain in the set concrete wall, thus avoiding waste of materials.

A still further object of the invention is to provide a clamp of the character described which leaves apertures in the set concrete wall which may be employed in securing other structural members thereto if desired.

The foregoing and additional objects and advantages of the invention will be apparent from a consideration of the following detailed description of one embodiment thereof, such consideration being given likewise to the drawings in which:

Figure 1 is a partially sectioned, fragmentary perspective view of a concrete wall form employing the tie clamps of the present invention;

Figure 2 is an elevational section taken on the line 2—2 in Figure 1;

Figure 3 is an enlarged portion of the device shown in Figure 2, but with the parts shown in position for insertion into the form;

Figure 4 is a view similar to Figure 3, but with the parts rotated to operative clamping position preparatory to pouring concrete into the form;

Figure 5 is an elevational section taken on the line 5—5 in Figure 3;

Figure 6 is an elevational section taken on the line 6—6 in Figure 4;

Figure 7 is a perspective view of the clamp device with the parts in position for insertion into the form; and

Figure 8 is an elevational section taken on the line 8—8 in Figure 2.

In the drawings, the reference character 10 indicates generally a concrete form comprised of a pair of opposed form walls 11, constructed of wooden planking or similar material, supported on upright studs 12, the latter being braced by longitudinal stringers 13. Two clamps 14 embodying the present invention, are shown extending through the stringers 13 on opposite sides of the form 10.

In Figure 2, it will be seen that the clamp 14 comprises a tension rod 15 which extends entirely through the form and projects from both sides thereof, being provided at one end with a group of pairs of inclined diametrically opposed slots to receive a slotted clamping wedge 17 of conventional design. The provision of a plurality of slots 16 provide for adjustment of the clamp to suit forms of various wall thicknesses.

The left-hand end of the tension rod 15 is threaded, as indicated at 15*a*, to receive a nut 18 which may be rotated to seat against the stringer 13, thus drawing the opposite walls of the form 10 toward each other. A snap ring 19, received in a groove adjacent the outer end of the rod 15, prevents the nut 18 from being entirely unscrewed from the rod 15, and lost.

As previously stated, it is desirable to provide an interior abutment within the form 10 to hold the form walls in accurately spaced relationship. To this end, a tapered inner spacer 20 constructed of tubular metal is provided, and is of a predetermined length such as to establish the interior spacing of the form walls. Spacers 20 may be provided in an assortment of lengths, thus accommodating forms of various thicknesses.

The aperture in the form walls which receives the clamp 14 is of such size as to relatively closely embrace the rod 15 at the right-hand form wall in Figure 2. Thus,

the right-hand end of the spacer 20 which is substantially larger that the rod 15 abuts against the interior surface of the right-hand form wall as shown in Figure 2.

The aperture in the left-hand form wall is of sufficient diameter to clear the large end of the tapered spacer 20. It will be noted, further, that the spacer 20 is provided at its left-hand end with the plug which may be welded or otherwise secured therein, and that an aperture 21*a* in the plug 21 is offset from the axis of the tapered spacer 20. An eccentric bushing 25 is mounted on the shaft 15 to support the same for limited relative rotation therein, the bushing being immediately adjacent the larger end of the spacer 20. The aperture 25*a* in the bushing 25 is also eccentric by an amount equal to the eccentricity of the aperture 21*a* in the spacer plug 21.

Thus, when the bushing 25 and the spacer 20 are in one position of relative rotation (that shown in Figures 3 and 7), the outer surface of the spacer 20 and that of the bushing 25 are aligned, and the entire clamp 14 with its spacer 20 thereon may be inserted through the form wall through an aperture substantially equal in diameter to the large end of the spacer 20. The exterior surface of the bushing 25 is slightly tapered, so that when the clamp member is inserted in the form wall as just described and a slight amount of pressure exerted thereon, the bushing jams or wedges in the aperture 26 and thus rotation thereof is retarded.

The spacer plug 21 has formed therein a keyway 22 which receives a swaged or upset key portion 23 formed in the tension rod 15. Thus, when the rod 15 is rotated, the spacer 20 is rotated therewith. A square wrench-receiving portion 24 is formed on the left-hand outer end of the rod 15 whereby the same may be rotated by the application of a wrench or similar tool. By rotating the rod 15 and the spacer 20 through an angle of 180° from the insertion position illustrated in Figure 3 to the abutting position shown in Figure 4, it will be seen that a substantial area of the larger end of the spacer 20 is offset with respect to the bushing 25, thus resting against the interior surface of the left-hand form wall (in Figure 2). To assure the rotation of exactly 180°, stop means are provided by milling away a portion of the outer surface of the bushing 25 to form a stop surface 27 against which a lobe 28 formed in the adjacent enlarged portion 29 of the tension rod 15 abuts, to limit the rotation of the shaft 15 to exactly 180°. In one limited position of such rotation, the outer surfaces of the spacer 20 and the bushing 25 are aligned, and in the other limiting position, such surfaces are offset by a maximum amount as indicated by the phantom line 30 in Figure 5.

After the concrete has been poured into the form and has set, the clamp member may be removed by knocking off the wedge 17 and withdrawing the rod 15 from the left, such withdrawal removing the bearing member 25 as well, since it is retained in place by the upset key member 22.

When the rod 15 and bushing 25, together with the nut 18, is withdrawn from the structure in the manner just described, it will be realized that the spacer 20 remains temporarily in the solid concrete. Due to the tapered form thereof, however, the spacer 20 may be readily knocked out of the concrete form by a few taps applied at the smaller end thereof, which is, of course, exposed after the form walls 10 have been stripped from the solid concrete. The tapered aperture remaining in the concrete may be filled in with plaster or if desired may be used in the securing of structural members to the concrete wall.

Having described the construction of the clamp 14, its operation is believed to be fairly apparent. After the form 10 has been erected, apertures through the same are drilled at various points to receive clamps 14 as shown in Figure 1. Such apertures are drilled with a bit or auger having an appropriate graduated diameter so as to form a relatively close fitting hole around the rod 15 in the right-hand form wall and a larger aligned aperture to receive the bushing 25 in the left-hand form wall. The hole through the stringer 13 is of sufficient clearance diameter to loosely pass the largest diameter of the bushing 25.

The apertures having been drilled, the clamps are thereupon inserted therein, and a few light taps on the left-hand end serve to wedge the bushing 25 into the aperture 26. When the bushing 25 has been seated in the left-hand form wall, the rod 15 is then rotated through 180° by application of a wrench to the wrench-receiving portion 24, thus offsetting the spacer 20 as previously described.

The clamping wedge 17 is then slipped over the right-hand end of the rod 15, a large circular aperture 17*a* being provided for this purpose, the slot 17*b* adjoining the aperture 17*a* then engaged with the appropriate pair of diametrically opposite slots 16 in the rod 15, and the wedge 17 driven downwardly to seat against the right-hand stringer 13. The nut 18 is then screwed tight against the left-hand stringer 13 to draw the form walls toward each other and firmly against the opposite ends of the interior spacer 20.

Thus, it will be seen that a rigidly held and accurately spaced form is produced, well able to withstand the hydrostatic pressure of the concrete and also readily removable after the concrete has set. When it is desired to vary the thickness of concrete wall that is to be produced, only one part need be replaced, to wit, the spacer 20, a new length being selected which is appropriate to the wall thickness to be produced.

While the device shown and described herein is fully capable of achieving the objects and providing the advantages hereinbefore stated, it will be realized by those skilled in the art that it is capable of some modification without departure from the spirit of the invention. For this reason, I do not mean to be limited to the form shown and described, but rather to the scope of the appended claims.

I claim:

1. A clamp for spaced form walls comprising: a spacer adapted to extend across the interior space between said walls, said spacer having a longitudinal bore therethrough which is eccentric with respect to the exterior surface of said spacer; a bushing adjacent an end of said spacer having an external diameter substantially equal to said end and a bore eccentric to the exterior of said bushing by an amount substantially equal to the eccentricity of said spacer bore; and rod means received in said bores to align the same whereby said spacer, when rotated about its bore axis with respect to said bushing, moves from a position of exterior alignment with said bushing to an externally offset position.

2. A clamp for spaced form walls comprising: a spacer adapted to extend across the space between said walls, said spacer having a longitudinal bore therethrough which is eccentric with respect to the exterior surface of said spacer; a bushing having a diameter at least as great as the largest transverse dimension of said spacer and a bore therethrough eccentric to the exterior of said bushing by an amount substantially equal to the eccentricity of said spacer bore, said bushing being axially tapered whereby to wedge in an aperture in one of said form walls; and rod means received in said bores to align the same whereby said spacer when rotated about the axis of said rod means and with respect to said bushing moves from a position of exterior alignment with said bushing to an externally offset position.

3. A clamp for spaced form walls comprising: a spacer adapted to extend across the interior space between said walls, said spacer having a longitudinal eccentric bore therethrough; a bushing adjacent an end of said spacer having a longitudinal bore eccentric by an amount substantially equal to the eccentricity of said spacer bore; and rod means received in said bores to

align the same whereby rotation of said spacer about its bore axis with respect to said bushing moves said spacer from a position of alignment with respect to said bushing to an offset position, said rod being rotationally keyed to said spacer whereby said spacer may be rotated to said offset position by rotation of said rod.

4. A clamp for spaced form walls comprising: a frusto-conical spacer adapted to extend across the space between said walls, said spacer having a longitudinal bore therethrough which is eccentric with respect to the larger end of said spacer; a bushing adjacent said larger end of said spacer having an external diameter substantially equal to said end and an eccentric bore; and rod means received in said bores to align the same whereby said spacer when rotated about its bore axis and with respect to said bushing moves from a position of substantial external alignment with said bushing to an offset position.

5. A clamp for spaced form walls comprising: a spacer adapted to extend across the interior space between said walls, said spacer having a longitudinal bore therethrough which is eccentric to the central longitudinal axis of said spacer; a bushing adjacent an end of said spacer having an eccentric longitudinal bore; rod means received in said bores to align the same for relative rotation of said spacer and bushing; and interengaged rotational stop means drivingly coupling said spacer and bushing to limit said relative rotation thereof to substantially 180°, the exterior surfaces of said bushing and spacer being substantially aligned at one limit of said relative rotation and offset at the other limit thereof.

6. A form clamp comprising: a tension rod; fasteners on said rod adjacent opposite ends thereof to exert inward pressure on transverse surfaces through which said rod extends; an eccentrically bored bushing carried on said rod between said fasteners; and an eccentrically bored tubular spacer carried on said rod between said fasteners and rotatable with respect to said bushing from a position of substantial external alignment therewith to an offset position to form abutments to receive said inward pressure.

7. A form clamp comprising: a tension rod; fasteners on said rod adjacent opposite ends thereof to exert inward pressure on transverse surfaces through which said rod extends; an eccentrically bored bushing carried on said rod between said fasteners; and a frusto-conical spacer having a longitudinal bore therethrough, said bore having one opening at an eccentric point in the larger end of said spacer, said rod being received in said bore for relative rotation of said spacer and bushing between externally aligned and externally offset positions.

8. A form clamp comprising: a tension rod; fasteners on said rod adjacent opposite ends thereof to exert inward pressure on transverse surfaces through which said rod extends; an eccentrically bored bushing carried on said rod between said fasteners; and an eccentrically bored tubular spacer carried on said rod between said fasteners and rotatable with respect to said bushing from a position of substantial external alignment therewith to an externally offset position to form abutments to receive said inward pressure.

9. A form clamp comprising: a tension rod; fasteners on said rod adjacent opposite ends thereof to exert inward pressure on transverse surfaces through which said rod extends; an eccentrically bored bushing carried on said rod between said fasteners; an eccentrically bored tubular spacer on said rod adjacent said bushing and rotatable with respect thereto; and interengaged rotational stop means drivingly coupling said spacer and bushing to limit said relative rotation thereof to substantially 180°, said bushing and spacer being substantially aligned at one limit of said relative rotation and offset at the other limit thereof.

10. A clamp for spacing and clamping a pair of spaced form walls, said form walls having transversely aligned apertures therein, one of which is of predetermined diameter and larger than the other, the combination of: a rod adapted to extend through both of said apertures and project beyond the outermost surfaces of said form walls; fasteners adapted to be secured to said rod outside of said walls to urge the same inwardly toward each other; a tubular spacer on said rod of such diameter as to pass through said larger aperture and of such length to extend between said walls to resist said inward movement thereof, said spacer having an eccentric bore; and a bushing on said rod adapted to be received in said larger aperture and having an eccentric bore whereby said spacer, when rotated with respect to said bushing about the axis of said rod, moves from a position of exterior surface alignment in which said rod, spacer and bushing may be inserted through said larger aperture to an offset position in which an end of said spacer abuts the interior surface of one of said walls adjacent said larger aperture.

11. The construction of claim 10 further characterized in that said spacer is rotationally keyed to, and longitudinally slidable on said rod whereby said spacer may be rotated to said offset position by rotating an end of said rod projecting beyond one of said walls.

12. The construction of claim 10 further characterized by having interengaged stop means formed on said spacer and bushing and drivingly coupling the same to limit said relative rotation thereof to substantially 180° from one limiting position in which said bushing and spacer are aligned as aforesaid to said offset position.

13. The construction of claim 10 further characterized in that said bushing is longitudinally tapered whereby to wedge into said larger aperture when inserted as aforesaid.

14. The construction of claim 10 further characterized in that one of said fasteners is non-rotatable on said rod, and the other fastener is a nut threaded on said rod.

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