April 22, 1924. 1,491,413

H. A. ORLOPP ET AL

CONCRETE FORM TIE AND SPACER

Filed July 16, 1923

Fig. 1.

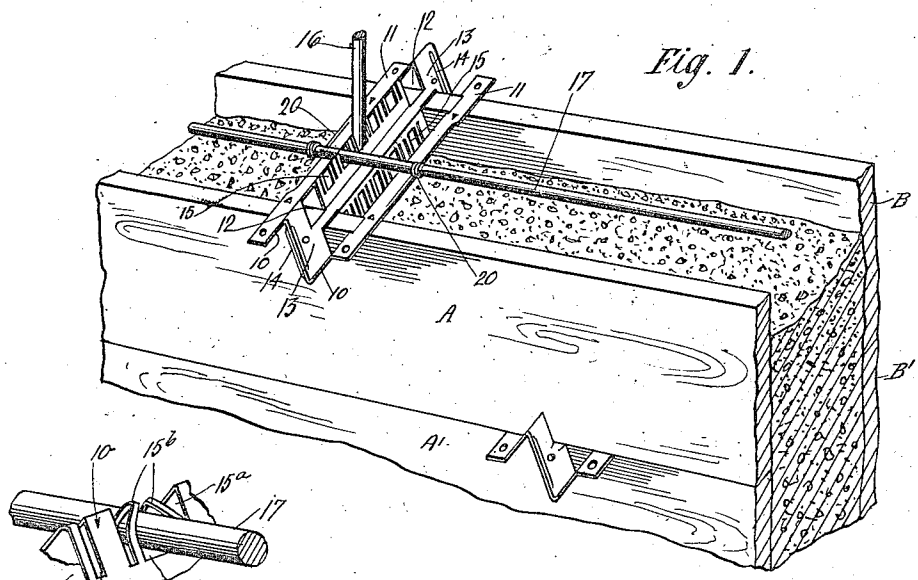


Fig. 5.

Fig. 2.

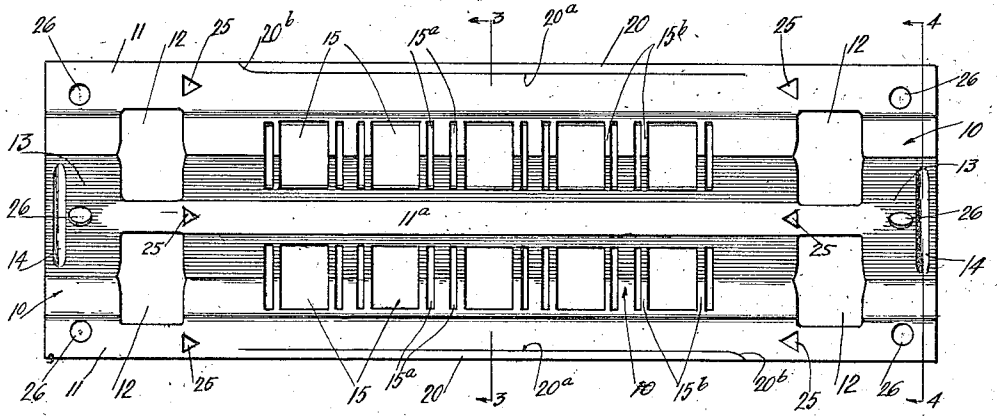


Fig. 3.

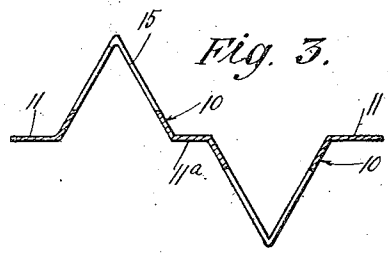
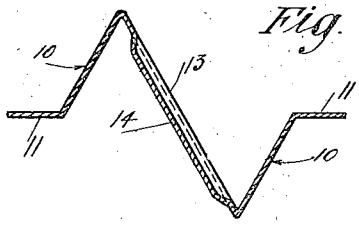


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CONCRETE-FORM TIE AND SPACER.

Application filed July 16, 1923. Serial No. 651,813.

To all whom it may concern:

Be it known that we, HARRY A. ORLOPP and DAVID BAKER SMITH, citizens of the United States, residing in Los Angeles, in the county of Los Angeles and State of California, have jointly invented new and useful Improvements in Concrete-Form Ties and Spacers, application #2, of which the following is a detailed specification.

This invention relates to improvements in that general type of concrete form tie and spacer that is the subject matter of our application Serial No. 616,946, now Patent 1,468,790, filed February 5th, 1923. In that application we have described a form of tie and spacer that involves an element made up of a metal plate, preferably thin, reinforced with longitudinal ridges preferably in V-form; and the ridges having notches near their ends for the reception of abutting edges of form boards. The present application also shows an element of those same general characteristics; but deals with certain improvements having to do, generally, with the provision of an element combining in it desirable improvements of form and structure to make it most practically and efficiently useful in many varying situations, to make the element of greatest strength and rigidity possible and at the same time to keep it simple and inexpensive. These and other objects of the present invention will be most readily apparent from the following detailed description of our improved tie and spacer, in a preferred specific form illustrative of the invention; and for this purpose we refer to the accompanying drawings in which:—

Fig. 1 is a perspective showing a typical use of our improved device;

Fig. 2 is an enlarged plan of the device itself;

Fig. 3 is a cross section on line 3—3 of Fig. 2;

Fig. 4 is a cross section on line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary perspective showing how a reinforcing rod may be held in place.

As has been explained in our said prior application, our device is adapted to span transversely the space between the opposite walls of a concrete or similar form, and to lie between abutting edges of form boards or plates. Such form boards or plates may be placed either in horizontal positions, edge on edge above each other, or may be placed in vertical positions with their longitudinal edges abutting; and in any such arrangement our tie and spacer may be used.

For instance, in Fig. 1 we show the application of our device to form boards that are laid horizontally, edge on edge. Here the opposite form boards are indicated by A, A^1 and B, B^1; and our spacing and tying element is adapted to connect the opposite form boards A and B and to lie between the form boards A and A^1, B and B^1, respectively.

The improved tying and spacing element involves a plate of preferably thin metal (in practice sheet metal) stiffened longitudinally with a ridge or ridges; preferably two V-shaped ridges 10, arranged on opposite faces of the plates and in staggered relation as illustrated. These V-shaped ridges 10 preferably extend from end to end of the plate; and at their outer edges there are flat parts 11 extending from end to end of the plate. These flat parts, together with flat part 11^a that is preferably provided between the two ridges, provide, in the main, the portions that take the tensile stresses on the element. These parts are therefore left in their full strength, or substantially so, without any perforations or reductions in cross sectional areas, except as will be specified. Although the outer flat parts 11 preferably extend clear to the end of the plate, the central flat part 11^a only extends to a point adjacent the outer edges of the notches 12 that are cut in ridges 10 to receive the abutting edges of the form boards, as is clearly illustrated in Figs. 1 and 2. Beyond these notches 12—in the outer end parts of the plates—the portion 13 of the plates that lies between the two apexes of the two ridges, lies in a flat and unbroken diagonal plane straight between the two apexes. Such a disposition of this part of the metal, exterior of the board receiving notches, strengthens the outer end parts of the elements against deformation due to outward pressure of the form boards. This formation, in effect, connects the two ridges (which take the outward thrust of the form boards) with a flat web that is much less liable to crumple or bend out of shape than if the part 13 were shaped with the offsetting horizontal part 11^a. Furthermore, in order to stiffen this part 13, it is formed

with a transverse bead 14, as illustrated. In our prior application we show the outer end parts stiffened by doubling the metal there. The beading here explained is another and preferred form of stiffening that part.

The function of ridges 10 is a three-fold one; they provide parts in which the board receiving notches 12 are made; and they also longitudinally stiffen the plates against any compressive strain. Furthermore, they provide diagonal portions—portions whose planes lie diagonal to the plane of the flat portions of the plate—through which openings 15 are made to receive and pass reenforcing rods 16 and 17 in a variety of directions. For instance, it will be seen that because these openings 15 are made in such diagonal portions of the plate, they can pass either vertical or horizontal reenforcing rods. In the particular and specific arrangement shown, wherein the openings 15 are in the apex portions of ridges 10, the vertical rods 16 (or, generally speaking, the rods that run in a general direction transverse to the plane of the plates) are passed through openings 15, whereas rods in a general direction parallel to the plane of the plates (horizontal rods in this particular illustration) are received in the notches that are formed in the apex of a ridge as illustrated. Then, in order to hold the rods 17 in proper position, we provide a narrow severable strip 20 along the outer edges of flat parts 11, which strips may be easily separated from the plates and wound around or otherwise secured to bars 17, as illustrated in Fig. 1. These severable strips 20 may be, to a greater or lesser extent, partially severed from the body of the plate along their longitudinal edges at 20^a and at one end at 20^b; while the opposite end is left solidly connected with the plate. This partial severance may be made in any suitable manner, as by partially shearing the strips from the plate, leaving the strip only attached to the plate by sufficient metal to hold it there until it is completely separated with the use of more or less force, as by the use of a pair of pliers. A scoring of the metal may be used with the same results.

Also, to hold a horizontal rod in place we may form slits or narrow openings 15^a at the sides of openings 15, thus forming narrow portions 15^b that are bent over the top of rod 17. Either this or the holding strip 20, or both, may be used.

When the concrete is cast in the forms, the tie and spacer elements are of course, cast into the concrete. During this casting operation the openings 15 play an important part in allowing free passage of the concrete through the plates, and also allow the escape of any air that might otherwise be entrapped under the upper ridge. It is for this reason, as well as to allow selected placement of the reinforcement rods in any desired position, that a plurality of spaced apertures is made in each ridge.

After the concrete has hardened and set, then those portions of the plates that project beyond the concrete may be pulled away, parting from the main portion of the plate at the surface of the concrete. This facilitates the removal of the form boards and removes all projecting metal parts from the concrete. In order to facilitate this removal of the outer parts of the plate, we weaken the longitudinal tensile portions of the plate at points adjacent the inner edges of notches 12. For instance, a small triangular opening, as illustrated at 25, may be stamped out, or partially stamped or sheared out of parts 11 of the plate, thus reducing the effective cross section of the plate at the exterior surface of the concrete and at the same place where the cross section of the plate is reduced by the notches 12. In determining the amount of this reduction of effective cross-sectional area and tensile strength of the plate, care is taken that this weakest portion of the plate is still strong enough to carry all tensile strains imposed upon the plate. Accordingly, the amount of weakening is governed by the tensile strain the plate is designed to carry. With the plate thus most weakened at the point specified, the outer ends are easily removed with a suitable pulling tool whose claws may be inserted through openings 26 in the end portions of the plate. Such a pulling tool may be, in principle of action, more or less like a claw hammer, its claws or teeth properly spaced to engage openings 26.

Having described a preferred form of our invention, we claim:

1. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally with a flat part at the side of the ridge, with a notch in the ridge near its end to receive a form board edge, and a weakening in the flat part adjacent the ridge notch to facilitate pulling away that part of the tie that lies exterior of the inner face of the form board.

2. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally and in staggered relation on opposite sides with flat parts of the plate at the sides of the ridges, the ridges being notched near their ends to receive the edges of abutting form boards, and the flat parts being weakened adjacent the notches for the purposes specified.

3. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally and in staggered relation on

opposite sides with flat parts of the plate at the sides of the ridges, the ridges being notched near their ends to receive the edges of abutting form boards, and the flat parts being weakened adjacent the notches for the purposes specified; and each ridge having apertures in its apex to pass reenforcing rods in different directions.

4. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally with a flat part at the side of the ridge, with a notch in the ridge near its end to receive a form board edge, and a weakening in the flat part adjacent the ridge notch to facilitate pulling away that part of the tie that lies exterior of the inner face of the form board, the plate having pulling holes at its end for the insertion of a pulling tool.

5. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally and in staggered relation on opposite sides with flat parts of the plate at the sides of the ridges, the ridges being notched near their ends to receive the edges of the abutting form boards, and the flat parts being weakened adjacent the notches for the purposes specified, the plate having pulling holes at its ends for the insertion of a pulling tool.

6. A tie for concrete or like forms, embodying a metal plate adapted to tie opposite form boards, the plate being ridged longitudinally and having a plurality of spaced apertures in the apex of the ridge forming openings for passing reenforcing rods in one direction and forming notches for receiving reenforcing rods in another direction, and a strip along the edge of the plate partially severed therefrom and adapted to be severed from the plate and engaged with a reenforcing rod to hold it in one of said notches.

7. A tie for concrete or like forms, embodying a metal plate ridged longitudinally on its opposite sides and in staggered relation, the ridges being V-shaped and extending from end to end of the plate and having near their ends notches to receive the abutting edges to form boards, the end portions of the plate in its parts lying between the ridges of the V's being reenforced with a transverse bead formed in the plate.

8. A tie for concrete or like forms, embodying a metal plate ridged longitudinally on its opposite sides and in staggered relation, the ridges being V-shaped and extending from end to end of the plate and having near their ends notches to receive the abutting edges of form boards, flat edge portions of the plate extending from end to end, a flat plate portion between the V's extending between points near the outer edges of the notches in the V's, the part of the plate exterior of the notches and between the V ridges extending in an unbroken diagonal plane between the ridges.

9. A tie for concrete or like forms, embodying a metal plate ridged longitudinally on its opposite sides and in staggered relation, the ridges being V-shaped and extending from end to end of the plate and having near their ends notches to receive the abutting edges of form boards, flat edge portions of the plate extending from end to end, a flat plate portion between the V's extending between points near the outer edges of the notches in the V's the part of the plate exterior of the notches and between the V ridges extending in an unbroken diagonal plane between the ridges, and said part being reenforced with a transverse bead formed in the metal.

10. A tie for concrete or like forms, embodying a metal plate provided with means to engage a form board or plate and provided with an opening to receive a reinforcing rod, and the plate being slitted adjacent the opening to form a part that may be bent over the reinforcing rod in the opening to hold it in place.

11. A tie for concrete or like forms, embodying a metal plate adapted to extend between opposite form boards and having notches to receive such boards, and the plate being further weakened adjacent the notches to facilitate pulling away that part of the tie that lies exterior of the inner face of the form board.

In witness that we claim the foregoing we have hereunto subscribed our names this 30″ day of June 1923.

HARRY A. ORLOPP.
DAVID BAKER SMITH.