

July 6, 1943.

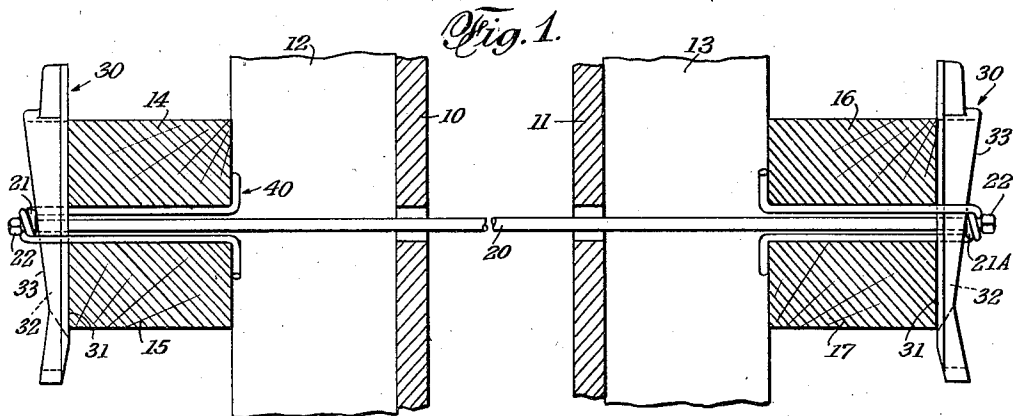
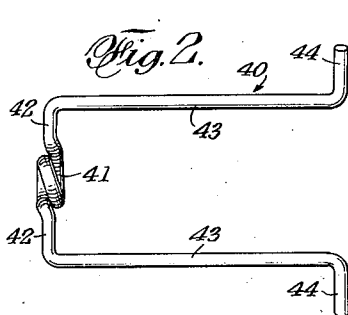
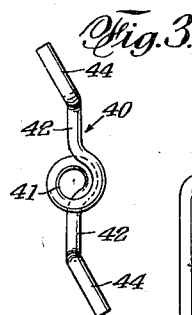
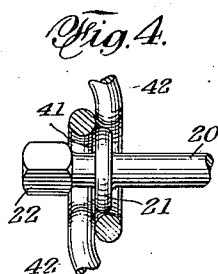
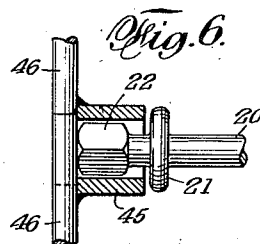
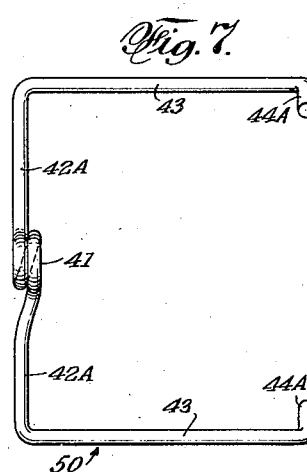
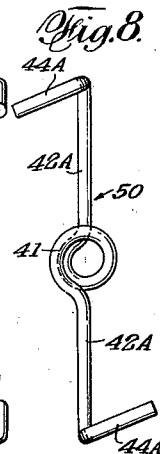
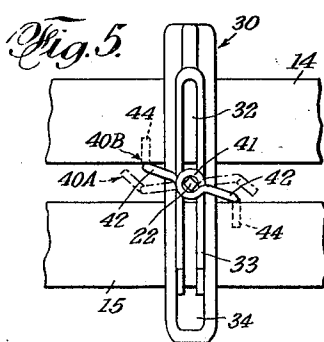
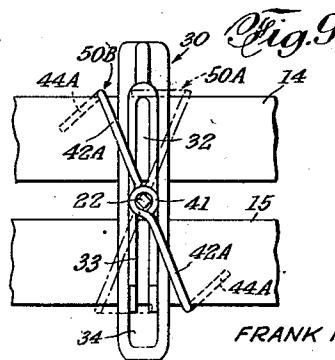
F. P. COOPER

2,323,705

WALL FORM TIE

Filed Dec. 5, 1941

2 Sheets-Sheet 1



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BY
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ATTORNEYS

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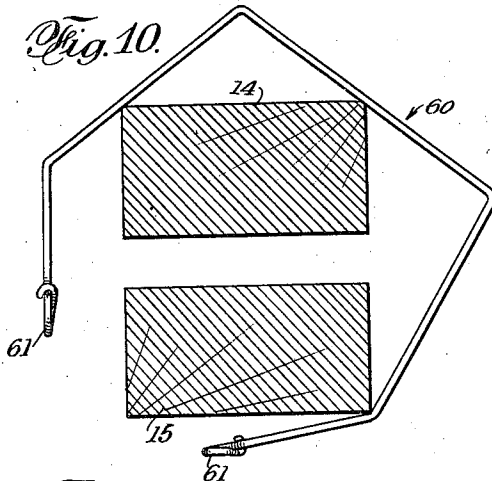
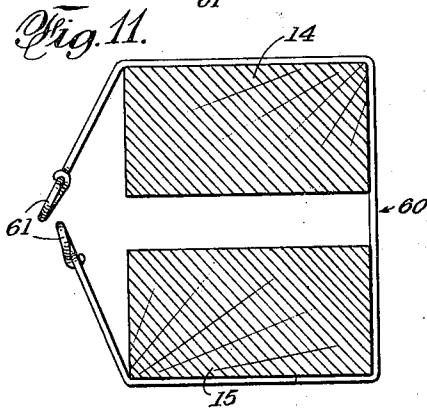
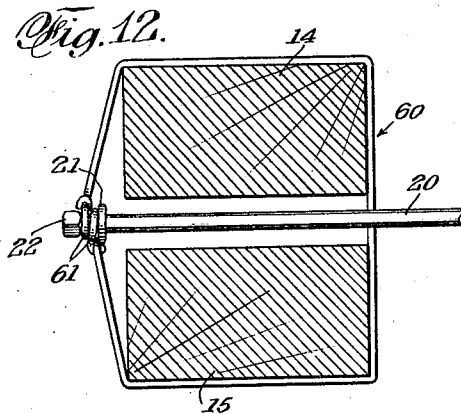
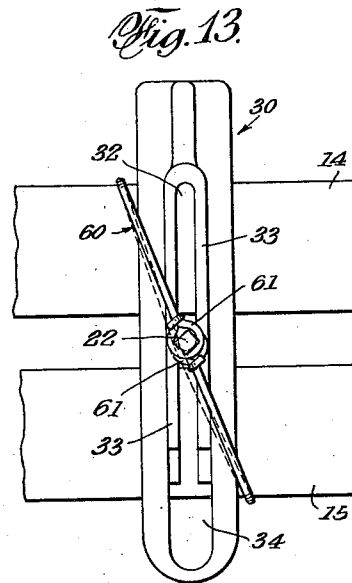
F. P. COOPER

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WALL FORM TIE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,323,705

WALL FORM TIE

Frank P. Cooper, Cranford, N. J., assignor, by
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York, N. Y.

Application December 5, 1941, Serial No. 421,747

13 Claims. (Cl. 25—131)

This invention relates to improvements in spacers for pull ties, and its object is to provide a simple tension device for interconnecting the ends of a tie rod which passes between pairs of walers of a form for receiving concrete and the inner surfaces of the walers in such a way that the distances between the inner surfaces of the walers and of the side walls of the form are predetermined by the length of the tie rod. In the "architectural" type of concrete work in which the exposed surfaces are as smooth and free from markings as possible, the tie rods which hold the form together are pulled out after the concrete is set and the holes from which they are removed should be as small as possible. For this reason tie rods without any projecting stops within the concrete are used and some arrangement for securing the tie rods to the sides of the form must be provided. According to my invention, a simple and inexpensive form of spacer is provided for connecting the ends of the tie rods to the walers of the form. A specific object of the invention is to provide a spacer for this purpose which is simple and inexpensive to make and easy to manipulate.

I will describe several embodiments of the invention in the following specification and will point out its novel features in appended claims.

In the drawings,

Fig. 1 is a transverse elevation of a form, a tie rod, tightening wedges and spacers which embody my invention, the parts of the form being shown in section;

Fig. 2 is a side elevation and Fig. 3 an end view of a spacer which is made according to and embodies the invention;

Fig. 4 is a side elevation on a larger scale of the end portion of a tie rod of standard construction and of a part of the spacer of the preceding figures shown in section;

Fig. 5 is an end elevation of a pair of walers and of a spacer of the preceding figures shown in different positions to illustrate the manner of application;

Fig. 6 is a view similar to Fig. 4 showing a modification of a part of the spacer;

Fig. 7 is a side elevation and Fig. 8 an end view of a spacer of a different form which also embodies the invention;

Fig. 9 is a view similar to Fig. 5 illustrating the method of applying the spacer shown in Figs. 7 and 8;

Figs. 10, 11 and 12 are side elevations, each showing a pair of walers in section, a tie rod and a spacer of another form which also embodies

this invention shown in different positions in the respective figures to illustrate the manner in which it is applied; and

Fig. 13 is an end elevation of the parts shown in Fig. 12 and of a tightening wedge.

The form for architectural concrete work is built up of side walls 10, 11, spaced vertical stringers 12, 13 and spaced longitudinal walers 14, 15 and 16, 17. The parts 10, 12, 14 and 15 are fastened together and so are the parts 11, 13, 16 and 17. These groups of parts are held apart in spaced relation by tie rods, such as that shown at 20. The tie rods pass through holes in the walls 10 and 11 and between the stringers and walers. Near their ends are integral heads 21 and 21A of a larger diameter than the rods themselves and they sometimes terminate in flat-sided ends 22 which have a larger transverse dimension than the diameter of the rods and a smaller transverse dimension than the diameter of the heads.

Wedges 30 are interposed between the head 21 and the walers 14, 15 and between the head 21A and the walers 16, 17. These wedges have flat surfaces 31 which abut the outer surfaces of the walers, slots 32 which clear the tie rod and inclined surfaces 33 which engage the heads 21, 21A. The lower ends of the slots are enlarged as at 34 (Fig. 13), so that they may be passed over the heads 21, 21A.

The spacer 40 shown in Figs. 1, 2, 3 and 4 comprises a central seat 41 for a tie rod head, from which arms 42 extend laterally. Longitudinal shanks 43 extend from the ends of the arms 42 and terminate in lateral fingers 44 which extend in a plane substantially parallel with that of the arms 42 and which, as may be seen from Figs. 3 and 5, extend at opposite angles from the arms 42. This device may be made conveniently from a single piece of wire of sufficient rigidity in which case the seat 41 is formed by one or more coils. As shown in the drawings, the inner coil is of sufficient diameter to clear the head and center the rod and the outer coil is of smaller diameter to form an abutment for the outer surface of the head.

The manner in which this device is applied is illustrated in Fig. 5. After the parts of the form have been assembled and the wedges placed in position, the shanks of the spacer, while the latter is held in the position shown at 40A, are thrust between the walers. When the seat 41 is over the tie rod head 21 the fingers 44 will be beyond the inner surfaces of the walers. Then the spacer is rotated to the position 40B to bring

its fingers 44 back of the walers. After this the wedges 30 are driven down to create a tension on the shanks 43 between the fingers 44 and the heads 21, 21A to fasten the tie rod and the walers together. The distance between the inner surface of the walers 14, 15 and the walers 16, 17 of the side walls 10 and 11 which are fastened to them will thus be determined by the distance between the heads 21, 21A regardless of the thickness of the walers.

In the modification shown in Fig. 6, a collar 45 is shown welded or otherwise secured to transverse members 46 which take the place of the arms 42. These members 46 are shown as abutting the end 22 of a tie rod which may have flattened sides, as shown, or may be of some other shape. This arrangement forms a cup-like seat for the end 22. If desired, the collar 45 may be long enough to abut the outer surface of the head 21.

The arms 42A of the spacer 50 shown in Figs. 7 and 8, are of sufficient length to enable the shanks 43 to go outside of the walers. This form of spacer may be put in place by holding it in the position 53A shown in Fig. 9 until its fingers 44A have passed beyond the walers and then rotating it to the position 50B in which its fingers 44A can engage the inner surfaces of the walers.

The spacer shown in Figs. 10-13 comprises a continuous piece of wire 60 with loops 61 at its ends. The wire 60 is bent into an approximately rectangular form. By spreading it open somewhat it may be slipped over the walers as shown in Fig. 10. Then it may be bent down against the upper surface of the waler 14 and the lower surface of the waler 15 as shown in Fig. 11, after which its loops 61 may be placed over the end 22 of a tie rod and against the tie rod head 21. This form of spacer may be tightened by a wedge 30 in the manner previously described.

Several forms of spacers which embody this invention have been illustrated and described to show that it is not limited to any specific construction and I intend no limitations other than those imposed by the appended claims.

What I claim is:

1. A wire tension spacer having a portion coiled to form a seat adapted to engage a portion of a tie rod near the outer end thereof outside of a waler, an arm portion extending laterally from the seat, and a shank extending at substantially right angles from the outer end of the arm, the free end of the shank being bent to form a laterally extending finger adapted to engage an outer surface of the waler.

2. A wire tension spacer having a portion coiled to form a central seat adapted to engage an enlarged portion of a tie rod outside of a waler near the outer end of said tie rod, arm portions extending laterally from the seat, and shanks extending at substantially right angles from the outer ends of the arms in spaced relation to the tie rod, the free ends of the shanks being bent to form laterally extending fingers adapted to engage an inner surface of a waler.

3. A wire tension spacer comprising a central portion bent to form an inner coil of sufficient diameter to clear a head near the outer end of a tie rod and an inner coil of smaller diameter to form an abutment for the outer surface of the tie rod head, arms extending laterally from said central portion, and shanks extending at substantially right angles from the free ends of the arms, the outer ends of the shanks being bent to form laterally extending fingers.

4. A wire tension spacer comprising a central portion bent to form an inner coil of sufficient diameter to clear a head near the outer end of a tie rod outside of a waler and an inner coil of smaller diameter to form an abutment for the outer surface of the tie rod head, arms extending laterally from said central portion, and shanks extending at substantially right angles from the outer ends of the arms in spaced relation to the tie rod, the free ends of the shanks being bent to form laterally extending fingers adapted to engage an inner surface of a waler.

5. A tension spacer comprising a wire bent into a substantially rectangular form adapted to surround a pair of walers and having loops formed at its ends adapted to surround an end portion of a tie rod passed between the walers and to abut an enlargement on the tie rod outside of the walers.

6. A tension spacer comprising a central seat adapted to engage an end portion of a tie rod outside of a pair of walers at one side of a concrete form, said tie rod portion being at a predetermined distance from walers at the other side of the form, arms projecting laterally from said seat, spaced shanks connected with said arms and fingers projecting laterally from the free ends of the shanks adapted to engage inner surfaces of the walers.

7. A tension spacer comprising a central seat adapted to engage an enlarged portion of a tie rod near the outer end thereof outside of a pair of walers at one side of a concrete form, said tie rod portion being at a predetermined distance from walers at the other side of the form, arms projecting laterally from said seat, spaced shanks connected with said arms and fingers projecting laterally from the free ends of the shanks adapted to engage inner surfaces of the walers.

8. A tension spacer comprising a central seat adapted to engage an end portion of a tie rod outside of a pair of walers at one side of a concrete form, said tie rod portion being at a predetermined distance from walers at the other side of the form, shanks connected with said seat adapted to be inserted between said pair of spaced walers, said shanks being spaced apart a distance limited by the distance between the walers and fingers projecting laterally from the free ends of the shanks, said spacer being adapted to be rotated to bring the fingers across the inner surfaces of the walers to engage said inner surfaces.

9. A tension spacer comprising a central seat adapted to engage an end portion of a tie rod, outside of a pair of walers at one side of a concrete form, said tie rod portion being at a predetermined distance from walers at the other side of the form, shanks connected with said seat adapted to be inserted between said pair of spaced walers, said shanks being spaced apart a distance limited by the distance between the walers and fingers projecting laterally from the free ends of the shanks in angular relation to a line through the ends of the shanks, said spacer being adapted to be rotated to bring the fingers across the inner surfaces of the walers to engage said inner surfaces.

10. A tension spacer comprising a central seat adapted to engage an end portion of a tie rod between a pair of spaced walers, at one side of a concrete form, said tie rod portion being at a predetermined distance from walers at the other side of the form, shanks connected with the head adapted to pass through the space between the

walers and fingers projecting outwardly from the free ends of the shanks in angular relation to a line through the ends of the shanks to engage inner surfaces of the walers.

11. A tension spacer having a seat adapted to engage a portion of a tie rod outside of a waler at one side of a concrete form, an arm extending laterally away from said seat, a shank connected with said arm, and a finger projecting laterally away from the free end of the shank at a predetermined fixed distance from the seat adapted to engage the inner surface of the waler.

12. A form spreader including in combination a tie rod adapted to pass between a pair of walers at one side of a concrete form having a head thereon outside of the walers, a tension connector having a seat arranged to engage said tie rod head, an arm projecting laterally away from said seat, a shank connected with said arm adapted to pass between the walers, and a finger project-

ing laterally away from the free end of the shank at a fixed distance from the seat adapted to engage the inner surface of a waler, and a wedge between the outer surface of the walers and the head of the tie rod.

13. A form spreader including in combination a tie rod adapted to pass between a pair of walers at one side of a concrete form having a head thereon outside of the walers, a tension connector having a central seat arranged to engage said tie rod head, arms projecting laterally away from said seat, spaced shanks connected with said arms, and fingers projecting laterally away from the free end of the shanks at a fixed distance from the seat adapted to pass between the walers and to engage the inner surfaces of the walers, and a wedge between the outer surface of the walers and the head of the tie rod.

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