Feb. 3, 1925. 1,524,926

W. L. GILES

CONCRETE FORM TIE AND SPACER

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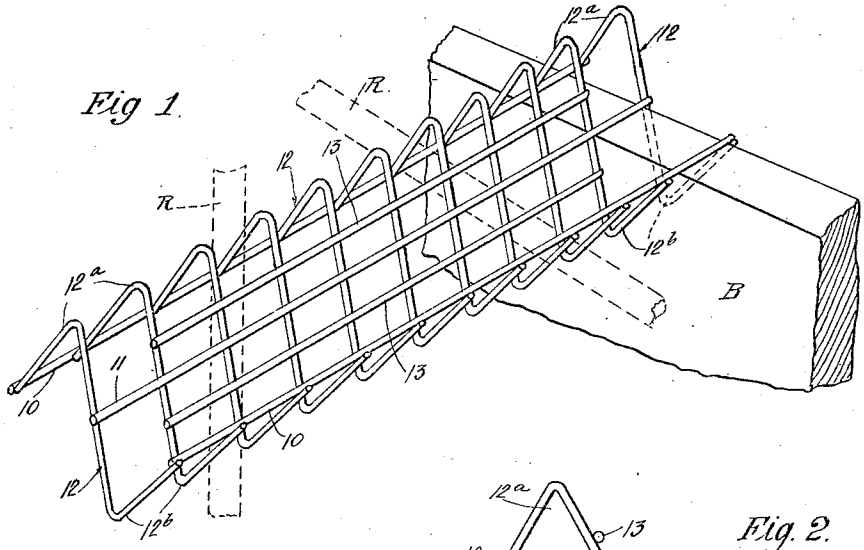
Fig. 1.



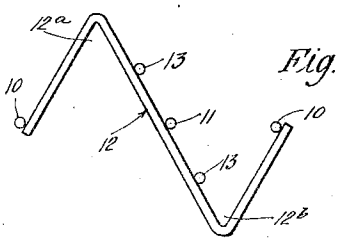


Fig. 2.

Fig. 3.

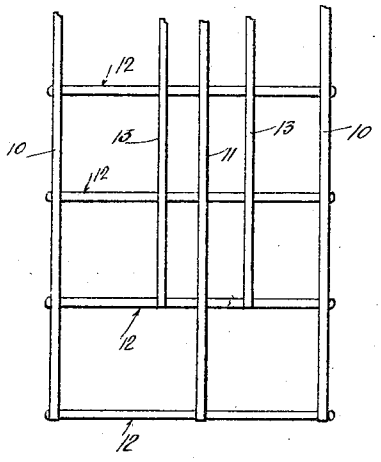
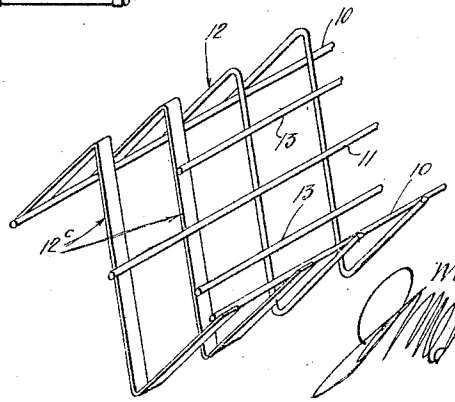


Fig. 4.



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CONCRETE FORM TIE AND SPACER

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Fig. 5.

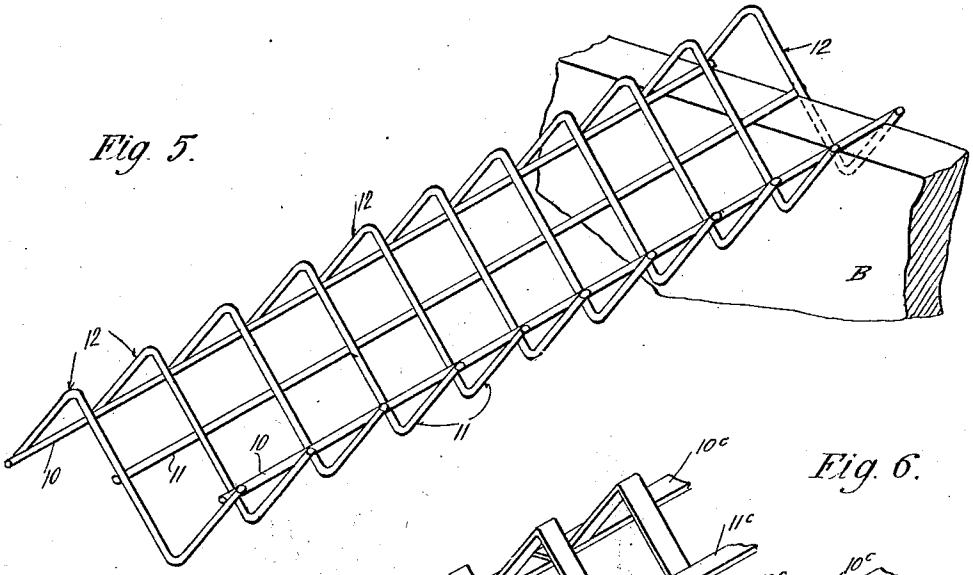

Fig. 6.

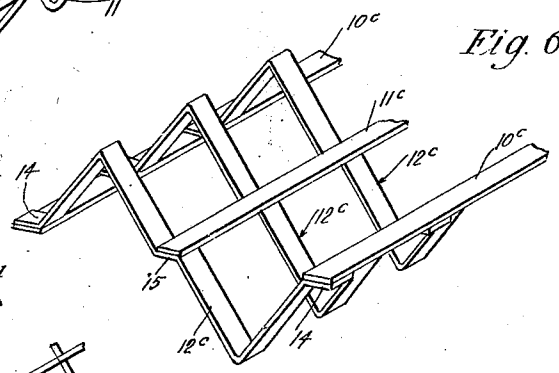

Fig. 8.

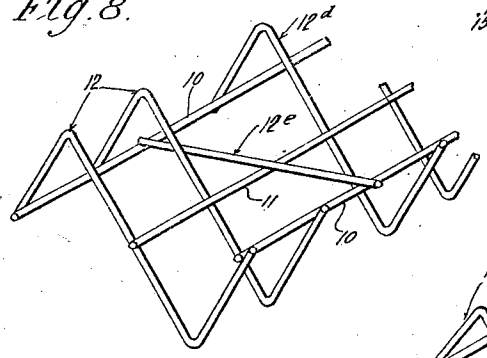

Fig. 7.

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Fig. 9.

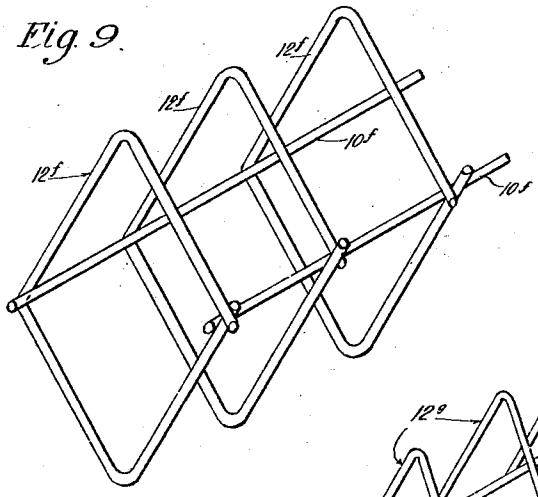


Fig. 10.

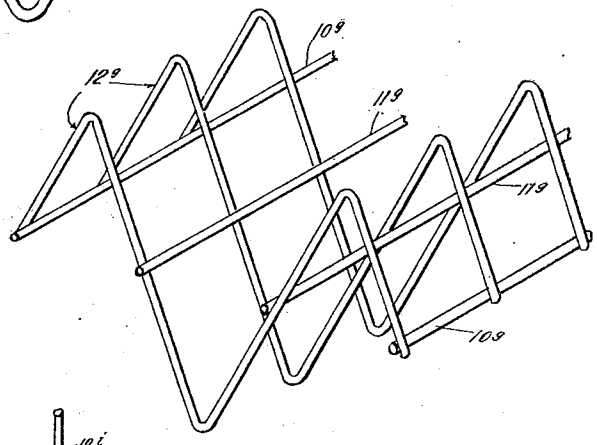


Fig. 11.

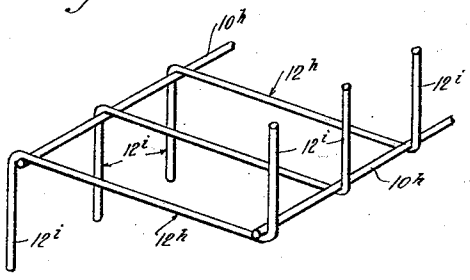
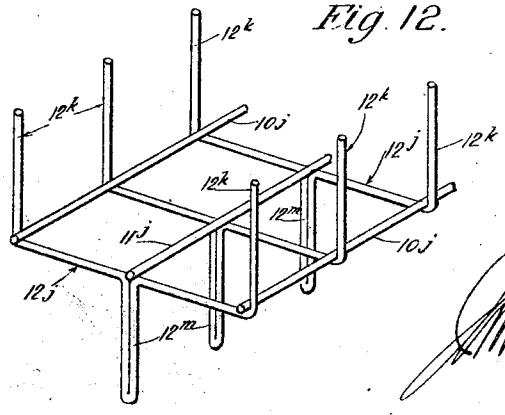


Fig. 12.



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Patented Feb. 3, 1925. 1,524,926

UNITED STATES PATENT OFFICE.

WILLIAM LLOYD GILES, OF SANTA ANA, CALIFORNIA, ASSIGNOR TO DAVID BAKER SMITH, OF LOS ANGELES, CALIFORNIA.

CONCRETE-FORM TIE AND SPACER.

Application filed April 16, 1924. Serial No. 706,859.

To all whom it may concern:

Be it known that I, WILLIAM LLOYD GILES, a citizen of the United States, residing in Santa Ana, in the county of Orange and State of California, have invented new and useful Improvements in Concrete-Form Ties and Spacers, of which the following is a detailed specification.

This invention has to do with devices for tying and spacing opposite boards or plates of concrete forms and similar apparatus; and although the invention is not necessarily limited to being applied to concrete form boards, nor to always exercising both functions of tying and spacing, it being practicable wherever boards or plates or the like should be either tied together or spaced apart, I shall describe the invention as applied to tying and spacing the opposite form boards of concrete forms as the invention will be most clearly understood from such description.

This invention is in the nature of an improvement upon devices for the same purposes set out in Letters Patent No. 1,468,790, granted to Orlopp and Smith on September 25th, 1923, on concrete form tie and spacer; and set out in application Serial No. 651,813, filed July 16th, 1923, by said Smith and Orlopp, entitled Concrete form tie and spacer.

Although the major objects of the present invention are to provide an effective device in which a minimum amount of metal is used and which offers the minimum obstruction to proper flow of concrete through and around the device, other objects and corresponding accomplishments will be understood from the following detailed specification wherein there is set forth a description of typical and preferred forms of device embodying the present invention. I may here add however, that in devices of this character it is of major importance that the cost of production is kept as low as possible. One of the larger items in the cost of concrete construction is the item of labor necessary for erection of forms. The devices here explained, like the devices of the prior patent and application, eliminate a great deal of the form erection labor. In order to make greatest possible saving it is necessary that the cost of the spacing and tying devices themselves be kept as low as possible; and this is one of the objects of my invention. This object is accomplished largely through economy in the amount of metal used and also through economies in methods of manufacture. In manufacturing my improved devices there is little or no work to be done with punching or forming dies, the devices being capable of being formed with comparatively inexpensive machinery, the wearing parts of which are easily and cheaply replaced.

For the purposes of the following detailed specification I show in the accompanying drawings several typical forms of devices embodying my invention, and in those drawings Fig. 1 is a perspective showing one form of device; Fig. 2 is an end view of that form; Fig. 3 is a fragmentary plan of that form; Fig. 4 is a fragmentary perspective of a modified form; Fig. 5 is a perspective of another modified form; Fig. 6 is a fragmentary perspective of another modified form; Fig. 7 is a perspective of another modified form; Fig. 8 is a fragmentary perspective of a modification of the form of Fig. 7; Figs. 9, 10, 11 and 12 are respectively, fragmentary perspectives of further modified forms.

The forms of devices shown in the accompanying drawings are designed to be made up of rather stiff wires or bars. The devices may be made up, as I hereinafter explain, either of round wires or bars or of wires or bars of other sectional shapes, such as flat wires or bars. And I shall refer to the various longitudinal and transverse elements of the several devices as bars, although the term wire might be equally applicable. In fact, the material used in the formation of these devices is what is ordinarily known as wire—a hard and stiff steel wire being preferred.

In the form shown in Fig. 1 there are three main longitudinal bars, two outside longitudinal bars 10 and a central longitudinal bar 11. Across these longitudinal bars and attached to them by welding or other suitable means are arranged the several transverse bars 12. These bars 12, as shown in Fig. 1, may be evenly spaced; or they may be unevenly spaced as is illustrated in other figures of the drawing. In Fig. 1 these transverse bars are shown to be bent substantially to Z-formations, and are secured at their ends to the two outside longitudinal bars 10 and at their centers to the central longitudinal bar 11. Thus, bars 10

and 11 lying in one and the same plane, it will be seen that the portions 12^a of the transverse bars project up above the plane of the longitudinal bars, while the portions 12^b of the transverse bars project down below that plane. Consequently, when the device is laid on the edge of a form board B, as is illustrated in Fig. 1, the downwardly projecting portions 12^b of adjacent transverse bars take the edge of form board B between them; and the lower edge of the next upper form board may then be placed in the space between the upwardly projecting parts 12^a of two adjacent transverse bars. Now, of course, any two adjacent transverse bars may take the edges of form boards between them in the manner described; but these devices will usually be designed and used to take the abutting edges of form boards into the spaces between the two outermost transverse bars at each end of the device. Consequently, the device as a whole may be stiffened by placing additional longitudinal bars at 13, these bars being welded to the transverse bars at each point of contact and extending only out to the next to the outermost transverse bars, leaving the spaces between the outermost transverse bars and the next ones open to receive the edges of form boards.

The device as thus made, although of light weight, is not only exceptionally strong as regards tensile strains but is also very rigid as regards twisting strains and very stiff as regards compressive strains. It is therefore very effective not only in holding form boards in proper alinement and keeping them from spreading apart, but also in holding them spaced apart at their proper distances.

Now it will be observed that the transverse bars inward of the two outermost ones at each end, in this particular design, may not be called upon to perform functions of engaging and holding form boards. They do however, enclose openings and spaces between them through which reinforcing and other rods may be passed and held in place, either in a vertical or a horizontal direction. See the dotted line showings at R in Fig. 1. Some if not all of these intermediate transverse bars may be omitted, as is explained in connection with other figures of the drawings; but even with a full provision of intermediate transverse bars, as shown in Fig. 1, it is seen that the device presents very little obstruction to the flow of concrete through or around it, and, that there is very little if any likelihood of pockets being formed in the concrete adjacent such a device.

In the form shown in Fig. 1 the longitudinal spacings between the two outermost transverse bars at each end are designed to take a form board or plate of standard thickness—say a standard one inch board. The spacings of the intermediate transverse bars may be varied to suit any conditions. It will be noted that it is the outermost transverse bar at each end that directly takes the strain from the boards when the boards tend to be spread apart by the interior concrete pressure; and that it is the next outermost transverse bars that directly take the strain from the boards if the boards tend to move inwardly toward each other. Consequently, it may be desirable in some instances at least to make these four transverse bars heavier so as to attain greater stiffness in themselves. And in Fig. 4 I indicate a form of device wherein the two outermost transverse bars 12^c at each end are made of heavier material and are, in this particular case, made of flat stock.

In Fig. 5 I show a form of device that is in all essentials the same as that shown in Fig. 1 except that the two longitudinal bars 13 are omitted; and in Fig. 6 I indicate a form of device like that of Fig. 5 but in which all of the transverse bars 12^c as well as the longitudinal bars 10^c and 11^c may be made of flat bar or wire. This form may require, for the purpose of making good welded joints, that the transverse bars be bent, as at 14 and 15, to make flat contact with the flat bars 10^c and 11^c; these longitudinal bars being laid so that their flat surfaces lie in their common plane. This form of device may have the advantage of greater strength and rigidity than one made of round bar or wire, without holding abutting edges of adjacent form boards too far apart. But it is to be noted, in connection with devices that use round longitudinal bars or wires that the adjacent edges of the form boards will not necessarily be held apart a distance equal to the full diameter of such bars because a little downward pressure brought to bear either on the bars themselves or upon the upper form board will cause the round bars to swing partially into the edges of the form board.

The transverse bars are preferably formed to an angular formation because that formation (with angular parts projecting above and below the plane of the longitudinal bars) helps to stiffen the whole structure and particularly to stiffen the board engaging bars against displacement or bending. However, it is not necessarily a restriction upon my invention that the transverse bars be shaped in the exact manner here specified.

One of the excellences of the device here explained is that it may be very economically manufactured. For instance, it may be manufactured in a continuous length, in a suitable machine which lays the bars out in flat grid formation, welds the various bars together, and then runs the flat grid through forming rolls to give the desired configura-

tion to the transverse bars. Then the continuous length may be cut up into any desired lengths to suit any desired wall thickness. It is also an advantage of my structure that, for instance in cases of emergency, a longer tie and spacer may be used for a relatively shorter spacing between the opposite form boards. It is apparent from Fig. 5 that if the intermediate transverse bars 12 are spaced the same distance apart as the outermost ones, any of the intermediate spaces may be used to take form boards.

In Fig. 7 I illustrate a form of device like that shown in Fig. 5, but wherein some of the intermediate transverse bars have been omitted, leaving, as an illustration, only two pairs of intermediate transverse bars as shown at 12^d. These intermediate bars may be spaced as desired to take either horizontal or vertical reinforcing rods or the like in any position. Or, as shown in Fig. 8, straight transverse bars 12^e may be placed in the spaces between the sets of transverse bars 12^d. It will be readily understood that such straight transverse bars 12^e are capable of confining a vertical reinforcing rod, and any number of such straight transverse bars 12^e may be used in the intermediate space between the outermost board confining bars 12. (It will be understood that I am describing my device in the position it assumes when applied to the upper and lower abutting edges of horizontally extending form boards; and this for convenience of description, although the relative positions will be changed if the device is applied to vertically extending form boards, for instance.)

In Fig. 9 I illustrate another form of device wherein there are two longitudinal bars 10^f and transverse bars 12^f bent to square or diamond configuration and each transverse bar being welded at opposite corners to the longitudinal bars.

In Fig. 10 a form is shown that involves substantially the same type of structure as shown in Fig. 5, but employing four longitudinal bars 10^g and 11^g, and the transverse bars 12^g instead of being Z-shaped are substantially W-shaped. This form simply adds to the form of Fig. 5 another angular projection above the plane of the longitudinal bars.

In the form of Fig. 11 there are two longitudinal bars 10^h, and the transverse bars 12^h are again substantially Z-shaped, but connect with the longitudinal bars at their anuglar bends instead of at their ends, leaving their ends 12^i projecting above and below the plane of the longitudinal bars, as illustrated.

And a further modification of the form of Fig. 11 is shown in Fig. 12, wherein the transverse bars 12^j are again connected to the longitudinal bars 10^j at their angular bends, but the ends 12^k of the transverse bars all project to one side of the plane of the longitudinal bars, while projections to the other side of said plane are formed by doublings of the transverse bars upon themselves, as illustrated at 12^m. In this form a central longitudinal bar as at 11^j may also be used if desired.

Having described a preferred form of my invention, I claim:

1. A tie and spacer for concrete forms or the like, embodying a grid of crossed and interconnected longitudinal and transverse bars.

2. A tie and spacer for concrete forms or the like, embodying a grid of crossed and interconnected longitudinal and transverse bars, the transverse bars being spaced apart and forming between them spaces to receive form boards.

3. A tie and spacer for concrete forms or the like, embodying a grid of crossed and interconnected longitudinal and transverse bars, the transverse bars being spaced apart and forming between them spaces to receive form boards, and intermediate transverse bars being spaced apart to form spaces to receive reinforcing rods.

4. A tie and spacer for concrete forms or the like, embodying a plurality of spaced longitudinal bars and a plurality of spaced transverse bars secured to the longitudinal bars, transverse bars being bent out of the plane of the longitudinal bars to take the edge of a form board between them.

5. A tie and spacer for concrete forms or the like, embodying a plurality of spaced longitudinal bars and a plurality of spaced transverse bars secured to the longitudinal bars, transverse bars being bent out of the plane of the longitudinal bars at opposite sides of the plane of the longitudinal bars to take abutting edges of form boards between them.

6. A tie and spacer for concrete forms or the like, embodying a plurality of spaced longitudinal bars and a plurality of spaced transverse bars secured to the longitudinal bars, transverse bars being bent out of the plane of the longitudinal bars to form angular parts projecting at opposite sides of the plane of the longitudinal bars to take abutting edges of form boards between them.

7. A tie and spacer for concrete forms or the like, embodying a plurality of spaced longitudinal bars and a plurality of spaced transverse bars, transverse bars near the ends of the longitudinal bars being bent out of the plane of the longitudinal bars to take the edge of a form board between them, and intermediate transverse bars being adapted to take reinforcing or like rods through the spaces between them.

8. A tie and spacer for concrete forms or the like, embodying a plurality of spaced

longitudinal bars and a plurality of spaced transverse bars, transverse bars near the ends of the longitudinal bars being bent out of the plane of the longitudinal bars to take the edge of a form board between them, and intermediate transverse bars being also similarly bent so as either to take reinforcing or like rods through the spaces between them extending in a direction transverse to the plane of the longitudinal bars or to take between them rods extending parallel to said plane.

9. A tie and spacer for concrete forms or the like, embodying a plurality of longitudinal bars, and a plurality of substantially Z-shaped transverse bars secured in spaced relation to the longitudinal bars.

10. A tie and spacer for concrete forms or the like, embodying two outer longitudinal bars, a plurality of substantially Z-shaped transverse bars secured at their ends to the longitudinal bars and spaced along those bars, and a central longitudinal bar secured to the central parts of the transverse bars.

In witness that I claim the foregoing I have hereunto subscribed my name this 27 day of March 1924.

WILLIAM LLOYD GILES.