

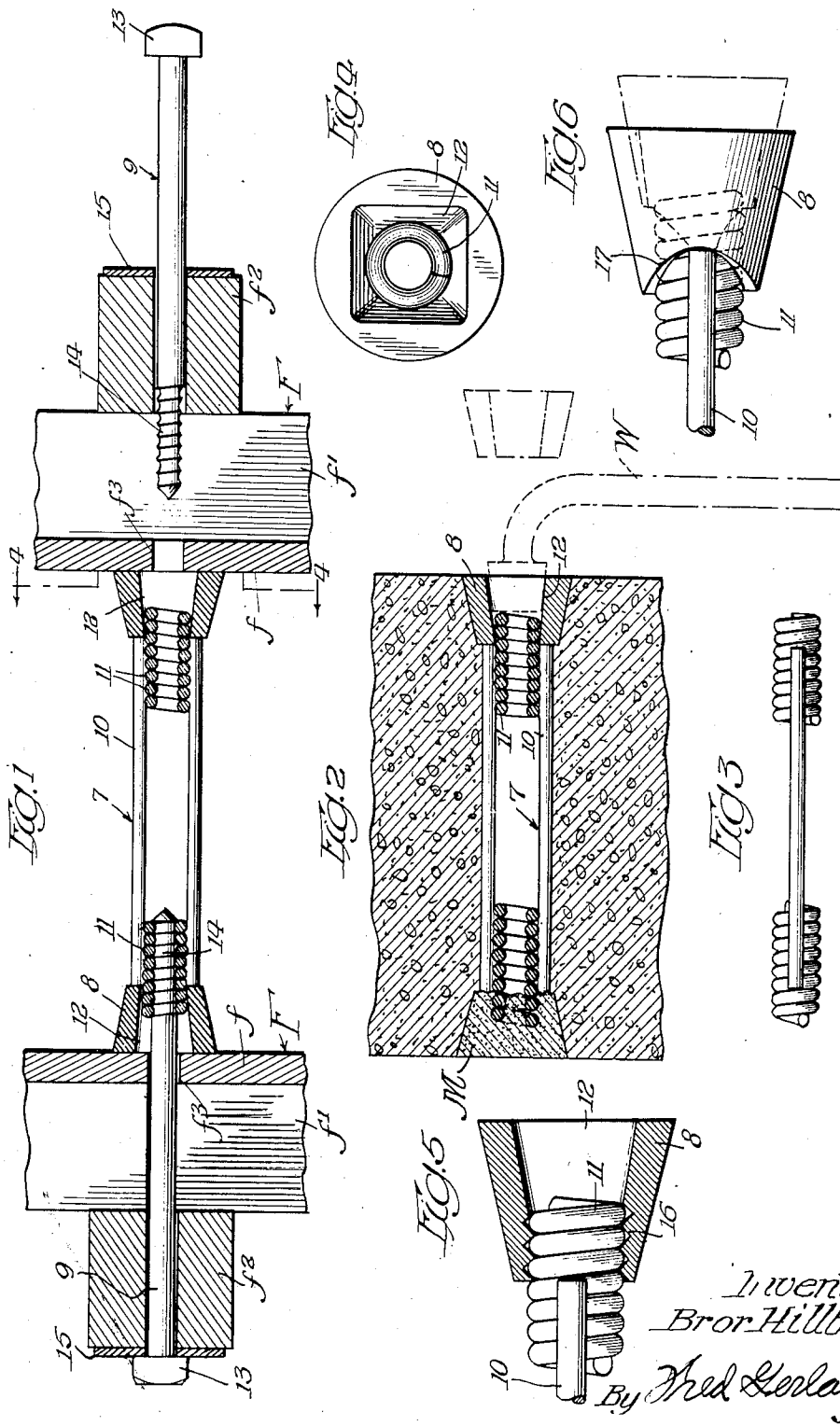
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COMBINED SPREADER AND TIE FOR CONCRETE FORMS

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COMBINED SPREADER AND TIE FOR
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The present invention relates generally to combined spreaders and ties. More particularly the invention relates to that type of combined spreader and tie which is designed to hold a pair of laterally spaced forms against inward and outward movement during pouring of concrete therebetween in connection with the formation of a wall or like structure and as its component parts comprises: (1) a strut which is adapted to be positioned between the two forms, serves as the spreader means and consists of a pair of parallel, spaced apart, conterminous rods and a pair of internally threaded members between, and welded to, the ends of the rods and in the form of helical rods; (2) a pair of centrally apertured frusto-conical members which are designed to fit between the internally threaded members and the forms and serve to space the ends of the strut from the forms; and (3) a pair of lag bolts which constitute the media for tying or holding the forms against outward movement and are adapted to have the shanks thereof extend through holes in the forms and also through the centrally apertured frusto-conical spacing members and into threaded engagement with the internally threaded members at the ends of the strut.

In assembling a combined spreader and tie of this type one of the lag bolts is inserted through the hole in one of the forms. Thereafter one of the frusto-conical spacing members is mounted on the central portion of the shank of the lag bolt and slid into contact with the inner face of the form, and one of the internally threaded members of the strut is applied to the inner end of the lag bolt shank and is turned so as to bring the bolt, the form and the spacing member into clamped relation. After this operation the one form is erected or positioned in its desired position and the other form is placed in spaced relation with it. After the second form is in place the other centrally apertured internally threaded frusto-conical spacing member is inserted between the hole defining portion of the other form and the other internally threaded member and the second lag bolt is inserted into place and is tightened until it, the second form, the second spacing member and the adjacent end of the strut are in clamped relation. After pouring and setting of the concrete between the forms the lag bolts are withdrawn and the forms are removed from the sides of the concrete structure. After removal of the forms the frusto-conical spacing members are removed from the structure by way of a wrench or other tool, and the

cavities in the structure resulting from the spacing members are filled with cement or other material. Heretofore it has been customary in a combined spreader and tie of the type under consideration to have the outer ends of the internally threaded members at the ends of the strut flush with the ends of the parallel laterally spaced rods to which the members are welded. When the outer ends of the internally threaded members are flush with the ends of the rods of the strut assembly of the combined spreader and tie is extremely difficult because it is necessary to align the second spacing member with the hole defining portion of the second form and the adjacent internally threaded member of the strut and to hold the second spacing member in place while the second lag bolt is inserted into place and tightened. Because of the difficulty of assembling, use of a combined spreader and tie of the type heretofore proposed has not been extensive and is accompanied by high labor costs.

The primary object of the present invention is to provide a combined spreader and tie of the aforementioned type which may be assembled with greater facility than, and eliminates the objectionable features of, previously designed combined spreaders and ties of the same general character by reason of the fact that it includes simple means whereby the frusto-conical spacing members may be releasably secured or connected to the internally threaded members of the strut in connection with assembly of the combined spreader and tie with respect to the two concrete forms. By providing means of this character the second frusto-conical spacing member is effectively held in place while the second lag bolt is inserted through the second form and the provision of separate or independent retaining or holding means for the second spacing member is thus obviated.

Another object of the invention is to provide a combined spreader and tie which is generally of new and improved construction and is characterized by simplicity of design as well as ease or facility of assembly.

Other objects of the invention and the various advantages and characteristics of the present combined spreader and tie will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawing which accompanies and forms

a part of this specification or disclosure and in which like letters and numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a vertical transverse section of a pair of parallel, laterally spaced forms having applied thereto a combined spreader and tie embodying or representing one form of the invention, showing the forms before the concrete has been poured therebetween to form a wall or other concrete structure and illustrating in detail the construction and design of the combined spreader and tie and the manner in which it is assembled;

Figure 2 is a section showing the strut of the combined spreader and tie of Figure 1 embedded in the concrete wall and illustrating the manner in which the frusto-conical spacing members are removed from the internally threaded members at the ends of the strut after removal of the two forms;

Figure 3 is a plan view of the strut of the combined spreader and tie of Figure 1;

Figure 4 is an enlarged section on the line 4-4 of Figure 1;

Figure 5 is a view partly in elevation and partly in section showing in a fragmentary manner a second form of combined spreader and tie wherein the frusto-conical spacing members have internal screw threads at their inner ends for screw threaded engagement with the outer ends of the internally threaded members of the strut; and

Figure 6 is a plan view showing in a fragmentary manner a third form of combined spreader and tie wherein the inner ends of the frusto-conical spacing members are provided with arcuate cam type cutouts which receive the ends of the parallel, spaced apart rods of the strut and are adapted in connection with removal of the spacing members by turning with a wrench, to coast with the ends of the rods in such manner as positively to urge the spacing members outwards away from the ends of the strut.

The combined spreader and tie which is shown in Figures 1, 2, 3 and 4 of the drawing constitutes one form or embodiment of the invention. It comprises a strut 7, a pair of frusto-conical spacing members 8, and a pair of lag bolts 9 and is illustrated in connection with a pair of vertically extending, parallel, laterally spaced forms F. As hereinafter described more in detail, the combined spreader and tie serves as a medium for holding the two forms against inward and outward movement during pouring of concrete therebetween in connection with the formation of a wall or other concrete structure. The forms F are of conventional design and comprise panels *f*, uprights *f*¹, and pairs of wale pieces *f*². The panels *f* are flat and are arranged in opposed relation as shown in Figure 2. The uprights *f*¹ are suitably secured to the outer faces of the panels and serve as a reinforcing medium for the panels. The wale pieces *f*² of the forms extend horizontally and are suitably secured to the outer faces of the uprights *f*¹. The strut 7, together with the frusto-conical spacing members 8, serves as the spreader means of the combined spreader and tie and is of unitary construction or design. It is adapted to remain permanently in, and to serve as a reinforcement for, the concrete which is poured between the two forms F, and consists of a pair of parallel, spaced apart, conterminous rods 10, and a pair of internally threaded members 11. The rods 10

are formed of steel or any other suitable metal and are so arranged that the ends thereof straddle the inner ends of the members 11. The latter are in the form of helical steel rods and connected to the rods 10 by welding. The outer ends of the members 11 project beyond the ends of the rods 10, as shown in Figures 1, 2 and 3, and serve, as hereinafter described more in detail, as means for removably connecting the frusto-conical spacing members 8 to the internally threaded members 11 at the ends of the strut 7. By reason of the fact that the members 11 are in the form of helical rods such members are exteriorly threaded as well as interiorly threaded. The frusto-conical spacing members 8 are preferably in the form of castings and are adapted to fit between the ends of the strut 7 and the inner faces of the form panels *f*. They are further adapted to be removed from the concrete after setting of the latter and removal of the forms F. As shown in Figures 1 and 2 the small ends of the spacing members 8 are adapted to extend inwards and abut against the ends of rods 10 and the large ends are flat so as to fit flatly against the inner faces of the form panels *f*. The members 8 have centrally positioned apertures 12 extending longitudinally there-through. The inner ends of these apertures are circular and the central portions and outer ends of the apertures are outwardly flared and polygonal so that a wrench W of the tapered polygonal head type may be applied thereto in connection with removal of the spacing members. The inner circular ends of the apertures are adapted to receive the outer ends of the internally threaded members 11 at the ends of the strut and are preferably of slightly less diameter than the outer ends of said internally threaded members so that they receive such ends with a frictional grip when the spacing members 8 are assembled with respect to the members 11. By providing means whereby the frusto-conical spacing members 8 may be releasably or removably connected to the internally threaded members 11 of the strut 7 assembly of the combined spreader and tie is facilitated and it is unnecessary to provide special means for retaining the spacing members 8 in place when the combined spreader and tie is applied to the forms F. The lag bolts 9 serve as means for preventing outward movement of the forms F. They comprise heads 13 and externally threaded shanks 14 and are adapted to extend through holes *f*³ in the panels *f* of the forms F. As shown in Figure 1 the holes *f*³ are aligned with the apertures 12 in the frusto-conical spacing members 8. When the combined spreader and tie is in assembled relation the heads 13 of the lag bolts are disposed adjacent the outer faces of the horizontally extending wale pieces *f*² and the shanks of the lag bolts extend through the holes *f*³ in the form panels *f* and the apertures 12 in the spacing members 8 and into the internally threaded members 11 at the ends of the strut 7. The external screw threads on the shanks of the lag bolts are dimensioned so as to fit the internal threads of the members 11. If desired washers 15 may be mounted on the outer ends of the lag bolt shanks 14 so as to form bearing surfaces between the heads of the lag bolts and the outer faces of the wale pieces *f*² of the forms. It is contemplated that the lag bolts be fully tightened when the combined spreader and tie is in its assembled position and when they are tightened they serve to clamp the spacing members

8 and the forms F against the ends of the strut 7 and result in the combined spreader and tie effectively holding the two forms against inward and outward displacement. In connection with assembly of the combined spreader and tie one of the lag bolts 9 is manipulated so as to cause the shank thereof to pass through the hole in the panel of one of the forms F. Thereafter one of the frusto-conical spacing members 8 is applied to one end of the strut 7 by inserting the outer or protruding end of the adjacent internally threaded member 11 into the circular inner end portion of the aperture 12 in the one spacing member 8. After this operation the one spacing member 8 is slid onto the inner end of the one lag bolt and the strut is turned so as to cause the inner end of the lag bolt shank to feed into the threaded interior of the adjacent member 11. When the strut is tightened to the fullest possible extent the form through which the one lag bolt is inserted and the one frusto-conical spacing member 8 are clamped between the head of the lag bolt and the adjacent end of the strut. After the various operations heretofore mentioned the one form F is erected or positioned where desired. When the one form is in place the strut 7 and the one lag bolt extend horizontally. After erection of the one form the other or second frusto-conical spacing member 8 is connected to the other end of the strut 7 by inserting into the inner end of the aperture 12 of said second spacing member the outer protruding end of the adjacent internally threaded member 11. Thereafter the other form F is erected in such manner that the hole f^3 in the panel f thereof is in registry with the aperture 12 in the second spacing member. After erection of the other form the second lag bolt is inserted through the hole in the panel of the other form and is turned in order to bring the inner end of the externally threaded shank thereof into threaded engagement with the member 11 at the adjacent end of the strut 7. When the second bolt is tightened to its fullest extent the second form is held in place against outward movement or displacement with respect to the one form. After assembly of the combined spreader and tie with the two forms concrete is poured into the space between the panels f . Upon setting of the concrete the two lag bolts 13 are removed and the forms are dismantled or removed from the concrete structure. After removal of the forms the frusto-conical spacing members 8 are removed by suitable manipulation of the wrench W. In connection with removal of the spacing members the tapered polygonal head of the wrench is inserted into the outer ends of the apertures 12 and the wrench is turned. Turning of the wrench causes any bond between the concrete and the external surfaces of the spacing members 8 to be broken and enables the operator readily to remove the spacing members from the concrete. Upon removal of the spacing members the cavities are filled with a mass M of cement as shown in Figure 2. By reason of the fact that the spacing members 8 are adapted to fit over and frictionally grip the outer protruding ends of the internally threaded members 11 of the strut 7, assembly of the combined spreader and tie is materially facilitated and it is not necessary to provide any special or independent means for holding the second spacing member in registry with the hole in the panel of the second form in connection with insertion and tightening of the second lag bolt.

The apertures 12 are preferably formed in the frusto-conical spacing members during casting of the latter. It is unnecessary to machine the inner ends of the apertures so that they are truly concentric with the outer peripheries of the spacing members in order to permit of turning of the members in connection with removal thereof from the concrete because there is a certain amount of give or resiliency to the outer protruding ends of the internally threaded members 11 due to the fact that the latter members are formed of helical rods. The aforementioned combined spreader and tie is characterized by the fact that it may be assembled with exceptional facility and extremely low labor cost. It is further characterized by the fact that it may be manufactured at no greater cost than the cost of the strut, spacing members and lag bolts. A particular advantage of employing means whereby the frusto-conical spacing members may be removably connected to the ends of the struts is that the spacing members may be attached or connected to the strut in connection with shipping of the combined spreader and tie from place to place.

The combined spreader and tie which is shown in a fragmentary manner in Figure 5 constitutes a second form or embodiment of the invention and is exactly the same in design and construction as that shown in Figures 1 to 4, inclusive, with the exception of the fact that each frusto-conical spacing member is provided at its inner end with an internal screw thread 16 which is shaped to receive and interfit with the protruding end of the internally threaded member at the adjacent end of the strut. The internal screw threads in the inner ends of the spacing members of the Figure 5 type combined spreader and tie afford a more positive removable connection between the spacing members and the internally threaded members at the ends of the strut than the slip-on frictional grip type of connections between the spacing members and internally threaded members of the combined spreader and tie of Figures 1 to 4, inclusive.

The combined spreader and tie which is shown in a fragmentary manner in Figure 6 of the drawing constitutes or represents a third embodiment of the invention and is the same as the combined spreader and tie of Figures 1 to 4, inclusive, except for the fact that each of the frusto-conical spacing members is of increased length and has at the inner end thereof a pair of diametrically opposite arcuate cam type cutouts 17. As shown in Figure 6, the cutouts 17 in each spacing member receive the adjacent ends of the rods of the strut and in connection with turning of the member during removal of the concrete, so coact with such ends of the strut rods as to cause the spacing member positively to be urged out of the concrete. In the Figure 6 type of combined spreader and tie the inner ends of the frusto-conical spacing members have slip-on, frictional grip removable connections between them and the protruding ends of the internally threaded helical rod type members at the ends of the strut.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

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

1. A combined spreader and tie designed for

use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in the concrete poured therebetween and embodying a rod and an internally threaded longitudinally extending member in the form of a helical rod fitting against the side of, and secured to, one end of said rod and having its outer end free and projecting beyond said one end of the rod, means for temporarily attaching the other end of the rod to the adjacent form, a centrally apertured spacing member adapted to fit between the other form and the adjacent end of the strut and be removed from the concrete after dismantlement of the forms and having the inner end thereof shaped to fit over and grip frictionally the free or projecting outer end of said internally threaded member, and adapted to abut against the end face of said one end of the rod and a bolt adapted to extend through said other form and the spacing member and into screw threaded engagement with said internally threaded member.

2. A combined spreader and tie designed for use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in the concrete poured therebetween and embodying a rod, an internally and externally threaded member in the form of a helical rod fitting against the side of, and secured to, one end of said rod, and having its outer end free and projecting beyond said one end of the rod, means for temporarily attaching the other end of the rod to the adjacent form, a centrally apertured spacing member of circular cross section adapted to fit between the other form and said other end of the strut and be removed from the concrete by turning after dismantlement of the forms and having the inner end thereof internally threaded to receive the externally threaded free or exposed outer end of the first mentioned member, and adapted to abut against the end face of said one end of the rod and a bolt adapted to extend through said other form and the spacing member and into screw threaded engagement with said first mentioned member.

3. A combined spreader and tie designed for use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in the concrete poured therebetween and embodying a rod and an elongated longitudinally extending internally threaded cylindrical member having its inner end thereof fitting against the side of, and secured to, one end of the rod and its other end projecting beyond said one end of the rod, means for temporarily attaching the other end of the rod to the adjacent form, a centrally apertured spacing member of circular cross section adapted to fit between the other form and the cylindrical member and be removed from the concrete by turning after dismantlement of the forms and having the inner end thereof shaped to fit over and grip frictionally the outer end of said cylindrical member and provided with an arcuate cam type cutout designed to receive said one end of the rod and adapted when the spacing member is turned in connection with removal thereof from the concrete so to coact with said one end of the rod as to cause the spacing member positively to move away from said cylindrical member, and a bolt adapted to extend through said

other form and the spacing member and into screw threaded engagement with the cylindrical member constituting part of the strut.

4. A combined spreader and tie designed for use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in the concrete poured therebetween and embodying a pair of parallel, spaced apart, conterminous rods and an elongated longitudinally extending internally threaded cylindrical member having the inner end thereof fitting between, and secured to, the ends of the rods that are at one end of the strut and the outer end thereof projecting beyond said ends of the rods, means for temporarily attaching the other end of the strut to the adjacent form, a centrally apertured spacing member of circular cross section adapted to fit between the other form and the cylindrical member and be removed from the concrete by turning after dismantlement of the forms and having one end thereof shaped to fit over and grip the outer end of said cylindrical member and provided with diametrically opposite arcuate cam type cutouts designed to receive said ends of the rods and adapted upon turning of the spacing member in connection with removal thereof from the concrete to coact with said ends of the rods in such manner as to effect positive outward movement of the spacing member relatively to the cylindrical member, and a bolt adapted to extend through said other form and the spacing member and into screw threaded engagement with the cylindrical member.

5. A combined spreader and tie designed for use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in concrete poured therebetween and embodying a rod and a pair of elongated longitudinally extending substantially cylindrical internally threaded members having the inner ends thereof in laterally offset but lapped relation with, and connected to, the ends of the rod and their outer ends projecting beyond the ends of the rod, and a pair of centrally apertured spacing members of circular cross section adapted to fit between the forms and the cylindrical members and be removed from the concrete by turning after dismantlement of the forms and having the inner ends thereof shaped to fit over and grip frictionally the outer projecting ends of said cylindrical members, and adapted to abut against the end faces of the rod and a pair of bolts adapted to extend through the forms and the spacing members and into screw threaded engagement with the members at the ends of the rod.

6. A combined spreader and tie designed for use in connection with a pair of laterally spaced concrete forms and comprising a strut adapted to extend between and transversely of the forms and be permanently embedded in concrete poured therebetween and embodying a pair of parallel, spaced apart, conterminous rods and a pair of elongated longitudinally extending internally threaded cylindrical members having the inner ends thereof fitting between and secured to the ends of the rods and their outer ends projecting beyond the rod ends, a pair of centrally apertured spacing members of circular cross section adapted to fit between the forms and the cylindrical members and be removed from the concrete by turning after dismantlement of the

forms and having the inner ends thereof shaped to fit over and grip the outer ends of said cylindrical members and provided with arcuate cam type cutouts designed to receive the rod ends and adapted when said spacing members are turned in connection with removal thereof from the concrete to coact with the rod ends in such manner as to cause the spacing members posi-

5 tively to be urged or moved away from the cylindrical members, and a pair of lag bolts adapted to extend through the forms and the spacing members and into screw threaded engagement with the cylindrical members forming parts of the strut.

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