United States Patent

Shoemaker

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[45] **Apr. 4, 1972**

[54] TIE ROD AND CONE ASSEMBLY FOR A CONCRETE WALL FORM

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[73] Assignee: **Symons Corporation,** Des Plaines, Ill.

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[21] Appl. No.: **74,397**

[52] **U.S. Cl.**.....**249/214,** 25/131 T, 249/41, 249/43, 249/217

[51] **Int. Cl.**.....**E04g 17/10**

[58] **Field of Search**.....25/131 T; 249/40, 41, 43, 214, 249/215, 217, 218

[56] **References Cited**

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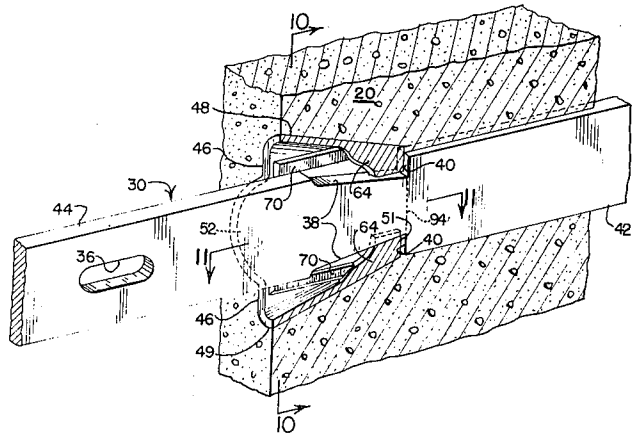
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Assistant Examiner—B. D. Tobor
Attorney—Norman H. Gerlach

[57] **ABSTRACT**

Two unitary one-piece plastic concrete-sealing cones for telescopic reception over the end regions of a flat tie rod which extends across the opposed spaced apart sides of a concrete wall form. The cones serve as washers to prevent concrete from passing through the tie rod openings in the form sides, and they also serve as spreader members, in which case they become interlocked with the tie rod against longitudinal shifting therealong. The cones establish voids in the side surfaces of the hardened concrete wall in the vicinities of breakbacks in the tie rod and a hammer blow on each projecting end of the tie rod releases such end from the concrete wall and effects removal of at least a portion of the adjacent cone from the adjacent void.

10 Claims, 13 Drawing Figures



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SHEET 1 OF 2

FIG. 1

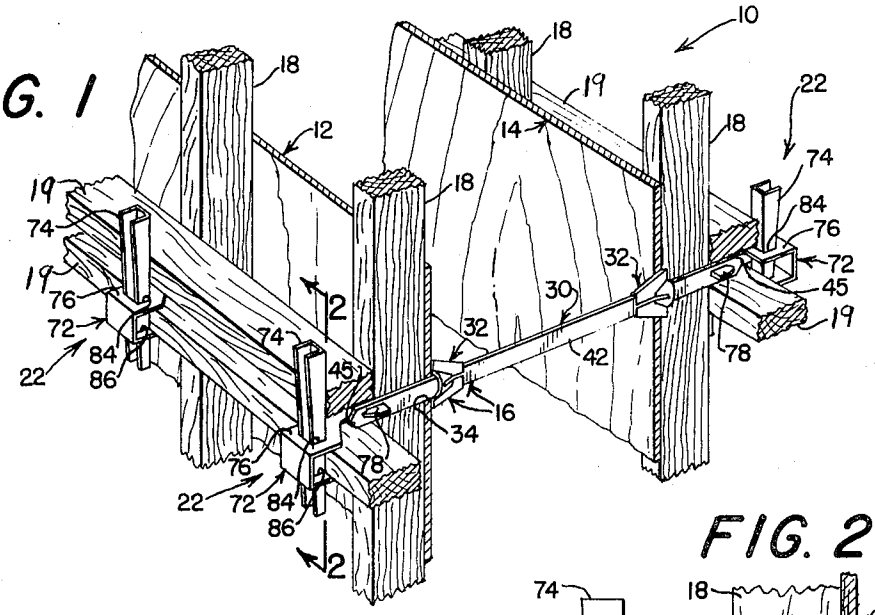


FIG. 2

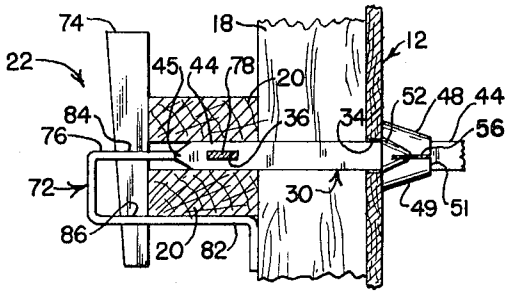


FIG. 3

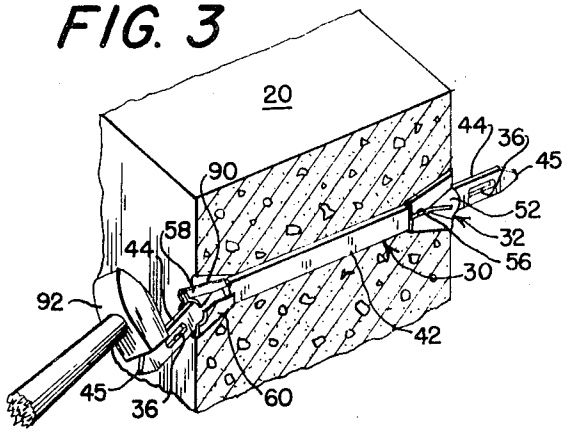


FIG. 4

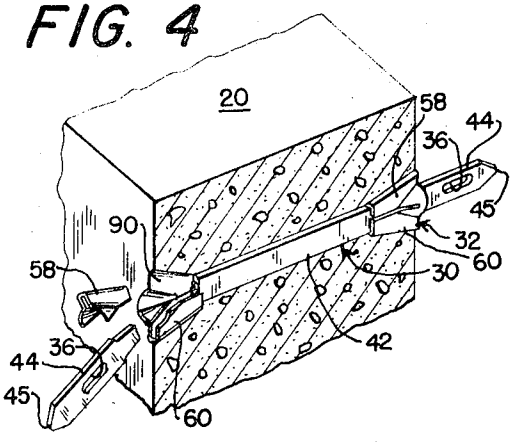


FIG. 5

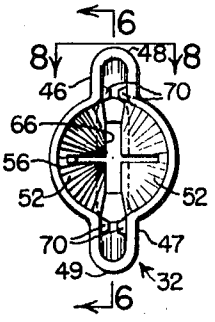


FIG. 6

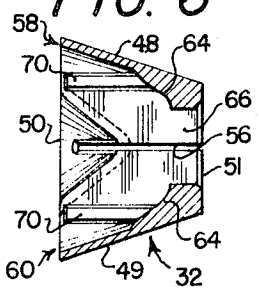


FIG. 7

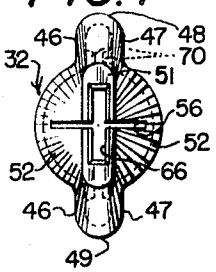
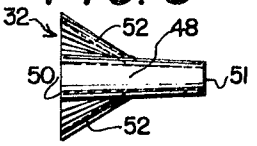


FIG. 8



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FIG. 9

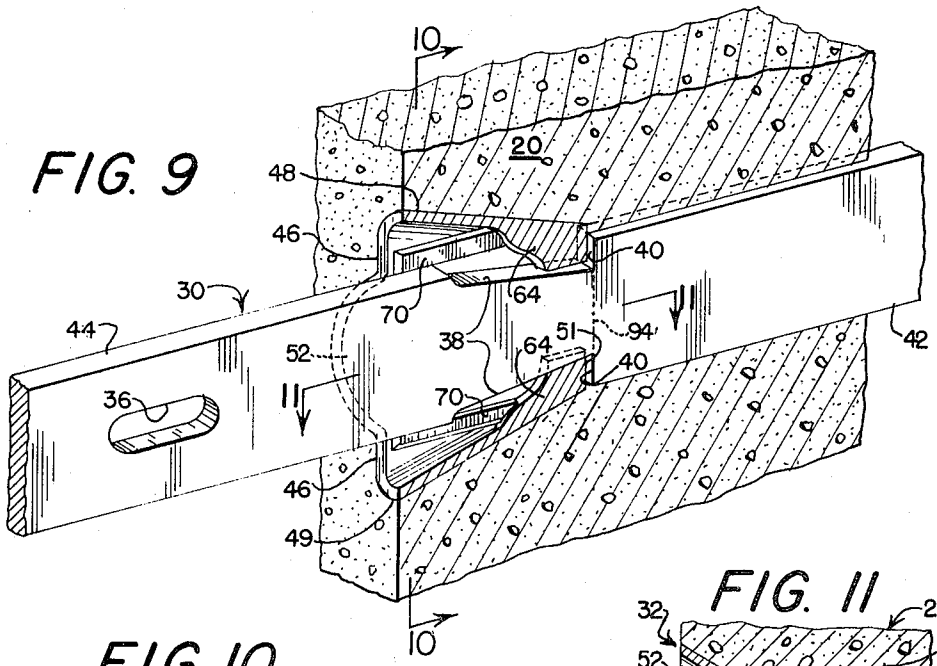


FIG. 10

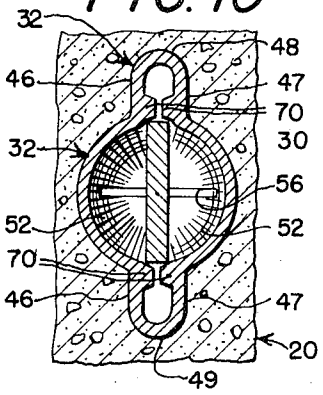


FIG. 11

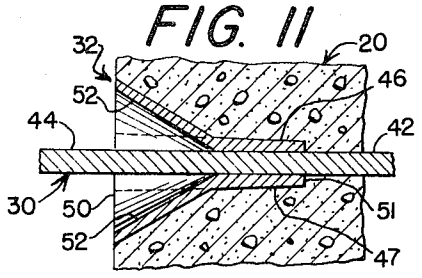


FIG. 13

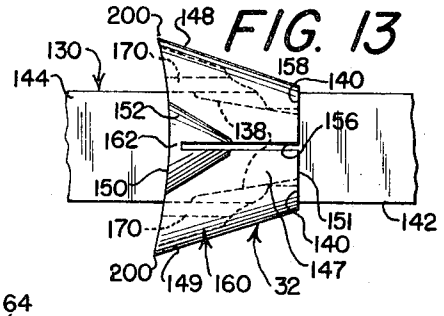
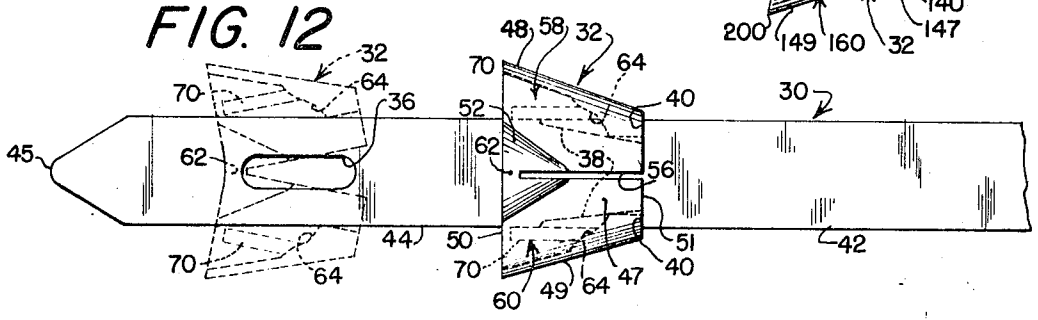


FIG. 12



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TIE ROD AND CONE ASSEMBLY FOR A CONCRETE WALL FORM

The present invention relates generally to a tie rod for use in connection with a concrete wall form and the like and has particular reference to a flat tie rod which with similar tie rods is designed for use in maintaining the opposed spaced apart sides of a concrete wall form in properly spaced relationship and in holding such form sides against outward displacement during pouring of wet concrete between sides of the form. Still more specifically, the invention is concerned with a frangible tie rod of the general type which is shown and described in U.S. Pat. No. 2,948,045, granted on Aug. 9, 1960 and entitled "TIE ROD ASSEMBLY FOR CONCRETE WALL FORMS AND CONE THEREFOR," the tie rod of said patent being adapted to project completely through the wall form sides and the intervening poured concrete so that after hardening of the concrete and removal of the form in its entirety from the formed wall the projecting ends of the tie rod may be bent, twisted, or otherwise "worked" in various directions to weaken the metal of the rod at the regions where said projections enter the concrete and thus permit rupture or severance of said projecting tie rod ends from the medial concrete-embedded portion of the rod. The tie rod which is shown and described in aforementioned U.S. Pat. No. 2,948,045 is designed for use specifically in connection with a concrete wall form which employs prefabricated "Steel-Ply" panels such as are manufactured and sold by Symons Corporation of Des Plaines, Illinois It is well known that "Steel-Ply" panels consist of rectangular plywood facings having marginal steel reinforcing frames which are notched in such a manner that when two panels are set up in edge-to-edge relationship, the frame notches are disposed in register and establish narrow vertical slots for reception therethrough of the adjacent tie rod ends. Being designed specifically for use with "Steel-Ply" concrete wall form panels, flat tie rods are seldom used with panels having wooden reinforcing frames but when they are so used on occasions, it has been the practice to cut shallow notches in the edges of the plywood facings, the tie rods fitting snugly in such notches so as to inhibit seepage of concrete through the notches when the concrete between the two opposed spaced apart sides of the form is poured. Additionally, it has been necessary practice further to seal the tie rod-receiving notches by interposing sealing washers between whatever type of spreader cones are used and the plywood facings.

The principal object of the present invention is the provision of a novel tie rod cone which is designed for assembly with a similar cone on the end regions of a flat tie rod of the character set forth in aforementioned U.S. Pat. No. 2,948,045. When the two cones are properly assembled upon such a tie rod, the resulting tie rod and cone assembly is particularly well adapted for use in connection with wood-reinforced concrete wall form panels where the end regions of the tie rod pass through circular openings or holes in the plywood facings of the associated panels. In such a concrete wall form installation, the tie rod cones accomplish two objectives, one of these being the elimination of the necessity for cutting rectangular notches in the edges of the plywood facings for passage of the end regions of the tie rod therethrough. With the improved tie rod and cone assembly, it is only necessary to cut circular holes in the plywood facings of the panels in order to accommodate the end regions of the tie rod of the assembly. The cutting of a circular hole may readily be accomplished at the scene of any given concrete wall form installation by a simple drilling operation, whereas the cutting of a rectangular notch is difficult and involves measuring operations. The tie rod cone of the present invention, therefore, extends the usefulness of a flat type tie rod by adapting the latter to convenient use in connection with wood-reinforced concrete wall form panels, as well as with "Steel-Ply" concrete wall form panels. The other objective involves the elimination of the need for a concrete sealing washer inasmuch as the tie rod cone of the present invention functions not only as a spreader member but also as a concrete seal.

A further advantage of the present tie rod cone is that it facilitates cone extraction after the protruding end region of the associated tie rod has been separated from the concrete-embedded medial portion of the rod. According to the invention, the present tie rod cone is located in the vicinity of a breakback in the associated tie rod, and after the poured concrete of the wall has become hardened, removal of the protruding end region of the tie rod is accomplished by imparting a downward blow to such region with an impact tool such as a hammer. Such downward blow not only fractures the tie rod at the point of breakback, but also fractures the cone and withdraws at least one-half of the cone from the breakback void automatically. The remaining portion of the cone (if any) may easily be withdrawn from the void inasmuch as it becomes loosened from the wall of the void at the time tie rod and cone fracture takes place. A further advantage of the present invention resides in the ease with which a pair of cones may be initially applied to a given flat tie rod, the installation usually being made at the factory rather than in the field by the simple expedient of slipping the cones over the tie rod in telescopic fashion and causing them to become automatically locked in position at such time as they move into place in the vicinity of the associated breakbacks in the rod. A still further advantage of the invention resides in novel interlocks between the tie rod and the latter's associated cones, the cones becoming progressively shrunk upon the tie rod as the tension in the latter increases.

Other objects and advantages of the invention, not at this time enumerated, will readily suggest themselves as the nature of the invention is better understood from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly pointed out by the claims at the conclusion hereof.

In the accompanying two sheets of drawings forming a part of this specification, two embodiments of the invention are shown.

In these drawings:

FIG. 1 is a fragmentary perspective view, partly in section, of a concrete wall form installation showing the improved tie rod and cone assembly operatively installed therein:

FIG. 2 is a vertical sectional view taken substantially on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary perspective view, partly in section, showing a portion of the concrete wall which was produced by the concrete wall form installation of FIG. 1, with one of the improved tie rod and cone assemblies in position within the hardened concrete of the wall and illustrating the manner in which one of the protruding end regions of the tie rod is broken away from the formed concrete wall;

FIG. 4 is a fragmentary perspective view similar to FIG. 3 but showing the one protruding end region of the tie rod completely removed from the formed concrete wall, together with a portion of the associated cone;

FIG. 5 is a front end view of one of the cones of the improved tie rod and cone assembly:

FIG. 6 is a vertical and longitudinal sectional view taken on the line 6—6 of FIG. 5;

FIG. 7 is a rear end view of the cone of FIG. 5;

FIG. 8 is a top plan view of said cone looking in the direction of the arrows in FIG. 5;

FIG. 9 is an enlarged fragmentary perspective view, partly in section, and similar to FIGS. 3 and 4 but showing the tie rod and cone assembly in position prior to removal of one of the protruding end regions of the tie rod;

FIG. 10 is a vertical transverse sectional view taken on the line 10—10 of FIG. 9;

FIG. 11 is a horizontal transverse sectional view taken on the line 11—11 of FIG. 9;

FIG. 12 is a fragmentary side elevational view of one end region of the tie rod and its applied cone, and illustrating the manner of installation of the cone of the tie rod; and

FIG. 13 is a fragmentary side elevational view of a portion of a tie rod in the vicinity of a slightly modified form of cone.

Referring now to the drawings in detail and in particular to FIGS. 1 and 9, a fragmentary portion of a composite concrete wall form of conventional construction is illustrated therein and designated in its entirety by the reference numeral 10. The wall form 10 consists of two opposed and spaced apart sides 12 and 14 which are maintained in their spaced apart relationship by means of a combined tie rod and cone assembly 16 which is constructed according to the present invention and is used with other similar assemblies. For purposes of illustration herein, the wall form sides 12 and 14 are considered to be in the form of rectangular plywood panels which are disposed in edge-to-edge relationship and are maintained in coplanar vertical relationship by vertical struts 18 which are backed by horizontal walers 19. The vertical struts 18 are nailed to the wall form sides 12 and 14 while the walers 19 are held in place by means of waler supporting bracket assemblies 22 which are attached to the opposite ends of the tie rod and cone assembly 16 in a manner that will be made clear presently. It is contemplated that after the concrete wall form 10 is assembled at a particular site, wet concrete will be poured into the space between the two form sides 12 and 14. When such concrete hardens, it forms a concrete wall 20.

The tie rod and cone assembly 16 is comprised of a tie rod 30 and a pair of cones (devices) 32, the latter constituting the principal feature of the present invention. Although the devices 32 do not present a conical appearance, they function in their broadest aspect in the manner of conventional devices which have come to be known in the art as tie rod "cones." For this reason, throughout this specification and in the claims appended hereto, the term "cone" will be employed to designate each of the two devices 32. Actually, the cones 32 are in the form of flattened tubular plastic members which present a generally trapezoidal appearance or configuration when viewed from either side thereof. The specific configuration of these cones will be set forth subsequently after the nature of the tie rod 30 on which the cones are installed or mounted has been set forth.

The tie rod 30 is in the form of a length of flat metal stock of rectangular cross section and of a longitudinal extent appreciably greater than the distance between the spaced apart sides 12 and 14 of the concrete wall form 10. The opposite end regions of the tie rod 30 project through circular holes 34 which are cut or drilled in the plywood panels 12 and 14 which form the sides of the concrete wall form 10. Longitudinally extending slots 36 are formed in such end regions of the tie rod and they cooperate with the parts of the aforementioned waler clamping bracket assemblies 22. As best illustrated in FIG. 9 of the drawings, at regions which are spaced inwardly from the opposite end regions of the tie rod 30 and which, when the tie rod is in actual use within a poured concrete wall, are disposed within the confines of the poured concrete, the metal of the tie rod is relieved by the provision of pairs of opposed slanting breakback recesses 38 which are in the form of shallow notches that terminate in transverse and outwardly facing shoulders 40, the recesses 38 serving to weaken the tie rod and establish "breakback" regions. The recesses 38 thus divide the tie rod into three sections, namely, a medial section 42 and two end sections or regions 44 (see FIGS. 1, 3 and 4), the medial section constituting a fixed section which is adapted to remain embedded in the hardened concrete of the wall 20 and the end regions 44 constituting free sections which are adapted to be removed by fracturing the tie rod along transverse lines in the vicinity of the breakback recesses 38 in a manner that will be made clear presently. The outer ends of the end regions 44 are pointed as indicated at 45.

The cones 32 of the tie rod and cone assembly 16 are adapted to be applied to the tie rod 30 either at the factory or in the field prior to setting up of the concrete wall form 10, and when in position on the tie rod, they assume positions wherein they span longitudinal distances of the end regions 44 extending from the pairs of shoulders 40 to the places where these end regions emerge from the side surfaces of the concrete wall 20. These cones serve the multiple functions of (1) providing outwardly facing shoulders which engage the opposed inside faces of the form sides 12 and 14, exert a spreading action thereon and prevent inward collapse thereof during erection of the concrete wall form 10, (2) creating voids in the side portions of the concrete wall 20, which voids, after the form sides have been removed from the wall, afford clearance pockets for "working" of the protruding end regions 44 in various directions so that the metal of the tie rod may be fractured along lines of cleavage preparatory to removal of such end regions 44, and (3) establishing concrete seals between the tie rod 30 and the circular holes 34 in the plywood panels of the form sides 12 and 14 and through which the tie rod projects.

Referring now particularly to FIGS. 5 to 8, inclusive, each cone 32, as previously set forth, is in the form of a flattened tubular molded plastic member. In its free state, the cone presents a pair of slightly spaced apart side walls 46 and 47 of identical trapezoidal outline, these two side walls being connected together by a converging bottom wall 49, such top and bottom walls being of curved or arcuate configuration as best shown in FIGS. 5, 7 and 10. The side walls 46 and 47 are generally planar, and since they are of trapezoidal outline, the cone, considered as a whole, presents a larger outer rim or end 50 and a small inner rim or end 51.

A limited portion of each of the two side walls 46 and 47 of each cone 32 deviates from the general plane of the wall by the provision of an outwardly bulging, convex, semi-conical flared apron-like portion 52, the two portions of the cone being directly opposed to each other across the large end of the cone, and, in combination with each other, defining what will hereinafter be referred to as a conical apron (see particularly FIGS. 8 and 12). The effect of this conical apron 52 is to impart to the large end 50 of the cone a generally circular portion (see FIG. 5) which is interrupted by a pair of diametrically opposite loops. The small end 51 of the cone is of slot-like configuration with straight sides and curved ends as best illustrated in FIG. 7.

As clearly shown in FIGS. 6, 7 and 12, the side walls 46 and 47 of each cone 32 are each provided with a central longitudinal or axial slot 56 which extends from the small end 51 of the cone nearly to the large end 50, the slot passing through the apex region of the conical apron 52 and onwardly to points near the base of such apron region. The slots 56 thus divide the cone 32 into two counterpart sections including an upper section 58 as viewed in FIG. 12 and a lower section 60, the two sections being joined together by two narrow connecting hinge-like webs 62 (see FIG. 12). As will be described in greater detail presently, the webs 62 establish flexible resilient connections between the upper and lower sections 58 and 60 and allow for slight spreading movement between these two sections during initial application of the cone 32 to the tie rod 30 as illustrated schematically in dotted lines in FIG. 12 and as likewise will be described in greater detail subsequently.

Considering now the internal configuration of the tubular cone 32, and as best shown in FIG. 6, the top and bottom walls 48 and 49 of each cone and the adjacent portions of the side walls 46 and 47 near the small end 51 of the cone flow into one another, so to speak, and provide thickened solid webs 64 which establish a narrow rectangular entrance slot 66 (see FIG. 7) for the tie rod 30 at the small end of the cone, the length of the slot being considerably less than the transverse width of the tie rod and the width of the slot being substantially equal to the thickness of the tie rod. The webs 64 also possess a functional characteristic in that they constitute the tie rod-engaging jaws which cooperate with the shoulders 40 (see FIG. 9) to provide an interlock between the cone and the tie rod when the tie rod assembly is put to use in a concrete wall form as will be described subsequently.

In addition to the internal webs 64, the inside faces of the side walls 46 and 47 of each cone 32 are formed with two pairs of longitudinally extending ribs 70 (see FIGS. 5, 6 and 9) which are parallel to each other and extend from the webs 64 to points near the large end 50 of the cone. These two pairs of ribs 70 are spaced apart a distance substantially equal to the

transverse width of the tie rod **30**, and as shown in FIG. **10**, the ribs of each pair overhang a longitudinal edge of the tie rod and maintain the cone **32** as a whole and the tie rod in their proper coaxial relationship against rocking of the cone on the tie rod. The planar portions of the side walls **46** and **47**, of course, closely hug the opposite sides of the tie rod **30** and prevent rotation or angular displacement of the cone with respect to the tie rod.

Referring now to FIG. **12**, as previously stated, installation of the two cones **32** on the tie rod **30** may be accomplished either at the factory or in the field, the installation taking place manually and without the use of tools by the simple expedient of telescopically sliding the cones over the opposite end regions **44** of the tie rod. Inasmuch as each cone **32** is comprised of two similar upper and lower sections **58** and **60**, the cone is reversible insofar as it may be applied to either end region **44** of the tie rod **30**. Inasmuch as the end extremities of the tie rod **30** are pointed, initial entry of either end region of the tie rod into the entrance slot **66** in the small end **51** of the cone will serve to spread the two sections **58** and **60** of the cone apart as shown in dotted lines in FIG. **12**, the two webs **64** riding on the opposite longitudinal edges of the tie rod as the cone is pushed further inwardly along the tie rod toward the adjacent slanting breakback recesses **38**. At such time as the webs **64** encounter the slanting recesses **38**, the webs **64** move inwardly toward each other until such time as they come into contact with the shoulders **40**. At this time, the cone **32** assumes its natural condition, i.e., the condition which it assumes in its free state prior to installation upon the tie rod, and the ribs **70** which, during sliding of the cone into its interlocked condition on the tie rod, initially moved out of contact with the longitudinal edges of the tie rod, now return to their normal positions of parallelism and closely hug such longitudinal edges as shown by the full line position of the cone in FIG. **12**. The slot **56** which, up until the cone attained its interlocked relationship on the tie rod, became widened as shown in the dotted line position of the cone in FIG. **12**, again is restored to its normal width or substantially so. The cone **32** is thus interlocked with the tie rod **30** so that during shipment and subsequent handling of the tie rod and cone assembly **16**, there will be no occasion for either cone to slip from its position on the tie rod. The slanting recesses **38** will not permit outward movement of the two cones **32** since the edges of such recesses are engaged by the webs **64**, while inward sliding of the cones on the tie rod is positively prevented by reason of the contact between these webs and the shoulders **40**.

Referring again to FIGS. **1** and **2**, in erecting any given concrete wall form such as the one which is illustrated in FIG. **1**, one side of the form is initially set up, for example, the side represented by the reference numeral **12**. The circular holes **34** are initially drilled in the two form sides **12** and **14** at appropriate locations so that after the side **12** is brought to its approximate vertical position, the various tie rods **30** of the tie rod and cone assemblies may be applied to said side by inserting either of the two end regions **44** through the corresponding holes from the inside of the form. The various struts **18**, having been previously nailed in position on the walls **12** and **14**, the walers **19** may be placed in position against the struts and the waler-supporting bracket assemblies **22** applied to the tie rod end regions so as to draw the walers hard against the struts in the usual manner of wooden wall form erection.

Various forms of waler-supporting bracket assemblies may be used for holding the walers in position and applying tension to the tie rods but for exemplary purposes herein the waler supporting bracket assemblies selected for use are of the general type which is shown and described in my copending U.S. Pat. application Ser. No. 808,503, filed on Mar. 19, 1969, and entitled "SELF-CONTAINED WALER CLAMP ASSEMBLY FOR CONCRETE WALL FORM." Reference may be had to such patent application for a full understanding of the nature of the waler-supporting bracket assemblies **22** shown in FIGS. **1** and **2**, but for purposes of description herein, it is deemed sufficient to point out that each assembly **22** is comprised of two parts, namely, a bracket proper **72** and a wedge **74**. The bracket **72** is of U-shape configuration and has an upper leg **76** which is formed with a hook **78** which is engaged in the slot **38** which is provided in the adjacent protruding end region **44** of the associated tie rod **30** a slight distance inwards from the pointed end extremity as is customary with tie rods of the character under consideration. The bracket proper **72** further is provided with a lower leg **82** which engages the outer face of the form side **12**. Aligned holes **84** and **86** in the legs **76** and **82**, respectively, receive the wedge **74** therein so that when the latter is driven downwardly by an impact blow, the walers **19** are drawn against the struts **18** while the adjacent protruding end region **44** of the tie rod **30** is placed under tension, thus drawing the large end **50** of the adjacent cone **32** against the inside face of the form side **12** in surrounding and concrete sealing relationship with respect to the circular hole **34**.

After all of the tie rods **30** of the various tie rod and cone assemblies **16** have thus been installed in their associated holes **34** in form side **12** and all of the wedges **74** of the waler-supporting bracket assemblies **22** have been driven into position, the various tie rods will extend horizontally away from the form **12** and in the direction of the form side **14** which subsequently is brought into position in order to complete the concrete wall form **10**. As the form side **14** is thus brought into position, the end regions **44** of the tie rods **30** that are remote from the form side **12** are caused to pass through the various circular holes **34** in the form sides **14** and the walers **19** and waler-supporting bracket assemblies **22** are then applied to the form side **14** in the manner previously described in connection with the form side **12**. After the various wedges **74** have been driven into place, the large ends **50** of the cones **32** will be drawn against the inside face of the form side **14** in sealing relationship with respect to the aforementioned circular holes **34** in the form side **14** and the concrete wall form **10** is then complete.

It is to be noted at this point that as each wedge **74** is driven into position, the pressure which the adjacent form side exerts against the large end of each cone **32** tends to collapse the cone, so to speak, and cause the solid webs **64** to squeeze the associated tie rod **30** therebetween to a degree which is proportional to the pressure that is exerted by the wedge **74**. At the same time, the large end **50** of the cone **32** bears hard against the inside face of the form side and completely encompasses the adjacent circular hole **34** so as to preclude egress of poured concrete through such hole at the time concrete-pouring operations are instituted.

The material from which the plastic cones **32** are molded is fairly resilient and possesses good restorative properties when deformed from its original shape. However, under certain circumstances, as, for example, in extremely cold weather, there is a possibility that the spreading action which is exerted on the webs **64** in the event that a given cone is installed upon a tie rod in the field may be such as to preclude complete return of the two cone sections **58** and **60** to their original positions. Stated otherwise, after pushing a given cone **32** onto the associated tie rod **30** in the manner previously described, the two webs **64**, although they may enter the breakback recesses **38**, may not close tightly upon the bottoms of such recesses. In such event, after the wedge **74** of the walter-supporting bracket **22** has been driven to its home position, the pressure that is exerted by the form side against the large end **50** of the cone will restore the cone to a fully "closed" condition wherein the webs **64** firmly grip the opposite side or longitudinal edges of the tie rod **30**.

In FIG. **13**, a slightly modified form of cone is shown, the cone being identified by the reference numeral **132** and being substantially identical in every respect to the cone **32** with the single exception that in the natural or free condition of the cone **132**, the large end **150** thereof is fashioned on an arcuate bias of large radius of curvature, thus affording a pair of projecting regions **200** which initially engage the inside face of the adjacent form side so that as the associated waler-clamping

and supporting bracket assembly causes the tie rod to be placed under tension in the manner previously described, the large end **150** is caused to flatten out on the inside face of the form side. Such flattening of the large end **150** insures a positive engagement of the webs **164** with the opposite sides of the tie rod. Due to the similarity between the form of cone **132** as shown in FIG. **13** and the cone **32** as shown in FIGS. **1** through **12**, and in order to avoid needless repetition of description, similar characters of reference but of a higher order have been applied to the corresponding parts as between the similar disclosures of FIG. **13** and FIGS. **1** to **12**. The cones **32** and **132** are interchangeable in use, their manner of application to a tie rod and their function in an erected concrete wall form being substantially the same.

The tie rod cones **32** and **132**, as the case may be, are conducive toward ready removal of the protruding tie rod end regions **44** from the hardened concrete wall **20** after the form sides **12** and **14** have been stripped therefrom. The manner in which such end regions are broken away from the medial concrete-embedded section **42** is schematically shown in FIGS. **3** and **4**. It will be understood, of course, that after stripping of the form sides **12** and **14** from the sides of the hardened concrete wall **20**, the medial section **42** of the tie rod **30** will remain firmly embedded in the hardened concrete of said wall while the cones **32** will establish conformably shaped pockets or voids **90** in the side surfaces of the wall, the end regions **44** of the tie rod **30** protruding end region **44** from the embedded section **42** may be accomplished by striking such protruding end region with an impact tool such as the sledge or hammer **92** so as to impart a downward blow thereto. Usually a single blow will suffice to fracture the tie rod at the base of the breakback recesses **38**, i.e., at a transverse line of cleavage extending across the tie rod in the vicinity of the shoulders **40** where the tie rod is narrowest, this line of cleavage being indicated by the dotted line **94** in FIG. **9**.

It is to be noted that immediately after the blow has been struck, the lower web **64** of the cone **32** will function as a fulcrum point for tilting of the dislodged tie rod end region **44** while the upper web **64** will automatically be compressed and pried, so to speak, outwardly of the void **90**, thus dislodging the upper section **58** and removing the same completely from the void as shown in FIG. **4**. At the same time, the lower section **60** of the cone will, by reason of the transfer of impact force thereto, also become loosened in the void **90**, this latter section, depending on chance, sometimes being completely removed from the void, or alternatively, remaining within the void, but in either event, the adhesive bond with respect to the wall of the void being broken. It is then a comparatively simple matter to extract such lower section **60** from the void, using a hook-like tool or other instrument for "fishing" it from the void. After removal of both cone sections **58** and **60**, the void **90** may be patched in the usual manner with grout to present a smooth wall surface. It will be understood that at the time the upper cone section **58** becomes dislodged from the void **90**, the webs **62** which normally join the two sections **58** and **60** together will yield and become fractured.

The tie rod cones **32** of FIGS. **1** to **12**, inclusive, and the tie rod cone **132** of FIG. **13** are particularly efficient when used with a tie rod which possesses slanting recesses of the character shown at **38**, but it will be understood that such cones are effectively useable with conventional flat slotted tie rods of the type shown and described in aforementioned patent application Ser. No. 808,503, or as shown in U.S. Pat. No. 2,948,045. Such conventional tie rods are equipped with breakbacks which are established by providing opposed pairs of V-shaped notches in the longitudinal side edges of the tie rods and the webs **64** of the cone **32**, or the webs **164** of the cone **132**, are so designed that they will cooperate with such conventional breakback notches so that the cone as a whole will function in the manner described herein, both during wall form erection and wall form dismantling.

It is also to be noted that although the cones **32** and **132** of the present invention have been described specifically in connection with the erection and dismantling of a concrete wall form employing all wooden sides, these cones will function equally efficiently in connection with a concrete wall form which employs "Steel-Ply" panels of the type that is shown and described in aforementioned U.S. Pat. No. 2,948,045.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention. Therefore, only insofar as the invention is particularly pointed out in the accompanying claims is the same to be limited.

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

1. A tie rod and cone assembly designed to hold a pair of upstanding concrete wall form sides in spaced relation, adapted to project through transversely aligned holes provided in said form sides, and comprising a one-piece strip of flat metal stock having parallel side edges which are formed with pairs of breakback recesses that are spaced inwards from the ends of the strip, thus dividing the strip into an inner medial section and outer end regions, and a tubular resilient cone telescopically received on each end region and having an inner rim provided with opposed jaw portions which project into the adjacent breakback recesses, and an outer rim which for the most part is remote from said end region, said cone being formed with oppositely disposed slots therein which extend from said inner rim to points adjacent to said outer rim thus dividing the cone into two identical counterpart sections which are joined together by narrow hinge-like webs in the vicinity of said outer rim, whereby axial pressure which is applied to said outer rim will maintain said jaw portions entirely within the confines of said recesses.

2. A tie rod and cone assembly as set forth in claim **1** and wherein said cone is of generally flat over-all configuration, and is provided with generally trapezoidal side walls which straddle and, for the most part, closely hug the opposite flat sides of the flat metal strip.

3. A tie rod and cone assembly as set forth in claim **2** and wherein said side walls are formed with outwardly bulging semi-conical convex apron portions which have their bases coincident with said outer rim of the cone, extend inwardly from said outer rim of the cone, and are adapted to seat against the adjacent side of the form when the tie rod is in position thereon.

4. A tie rod and cone assembly as set forth in claim **3** and wherein each side wall is formed internally of the cone with a pair of protuberances which straddle the side edges of said outer end region in close proximity thereto.

5. A tie rod and cone assembly as set forth in claim **4** and wherein each of said protuberances is in the form of a longitudinally extending rib which extends from one of said jaw portions to a region closely adjacent to said outer rim of the cone.

6. A tie rod and cone assembly as set forth in claim **4** and wherein each of said breakback recesses is in the form of an elongated shallow notch which terminates at its inner end in an outwardly facing jaw-engaging shoulder.

7. A tie rod and cone assembly as set forth in claim **6** and wherein the shallow notches afforded by said breakback recesses present inwardly slanting bottom walls.

8. A tie rod and cone assembly as set forth in claim **2** and wherein each of said trapezoidal side walls has its large base coincident with the outer rim of the cone and such large base is of arcuate configuration on a relatively large radius of curvature.

9. A tie rod and cone assembly designed to hold a pair of upstanding concrete wall form sides in spaced relationship adapted to project through transversely aligned holes in said form sides, and comprising a tie rod in the form of a one-piece strip of flat metal stock presenting straight parallel side edges, said side edges being provided at a region spaced inwardly from one end of the strip with recesses the existence of which establishes a reduction in the transverse width of the strip and

a consequent weakening of the tie rod at such region, thus dividing the tie rod into a fixed inner section adapted to remain embedded in the concrete which is poured between said form sides and a free outer end region adapted to project outwardly from one face of the poured concrete and be wrested from the fixed section by impact thereagainst, and a tubular cone encompassing said end region of the strip and extending a short distance longitudinally from said region toward said one end of the strip, said cone having an outer rim adapted to bear against said one form side and an inner rim projecting into said recesses, said outer rim being for the most part disposed remote from said strip, said cone being formed with oppositely disposed slots therein extending from said inner rim to points adjacent to said inner rim, thus dividing the cone into identical counterpart sections which are joined together by narrow frangible connecting webs, whereby the pressure exerted by said one form side against the outer rim of the cone serves to maintain said inner rim disposed in said recesses.

10. A tie rod and cone assembly as set forth in claim **9** and wherein said cone is of generally flat over-all configuration and is provided with trapezoidal side walls which straddle and, for the most part, closely hug the opposite flat sides of the strip.

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