Aug. 9, 1960 J. E. IMONETTI 2,948,045

TIE ROD ASSEMBLY FOR CONCRETE WALL FORMS AND CONE THEREFOR

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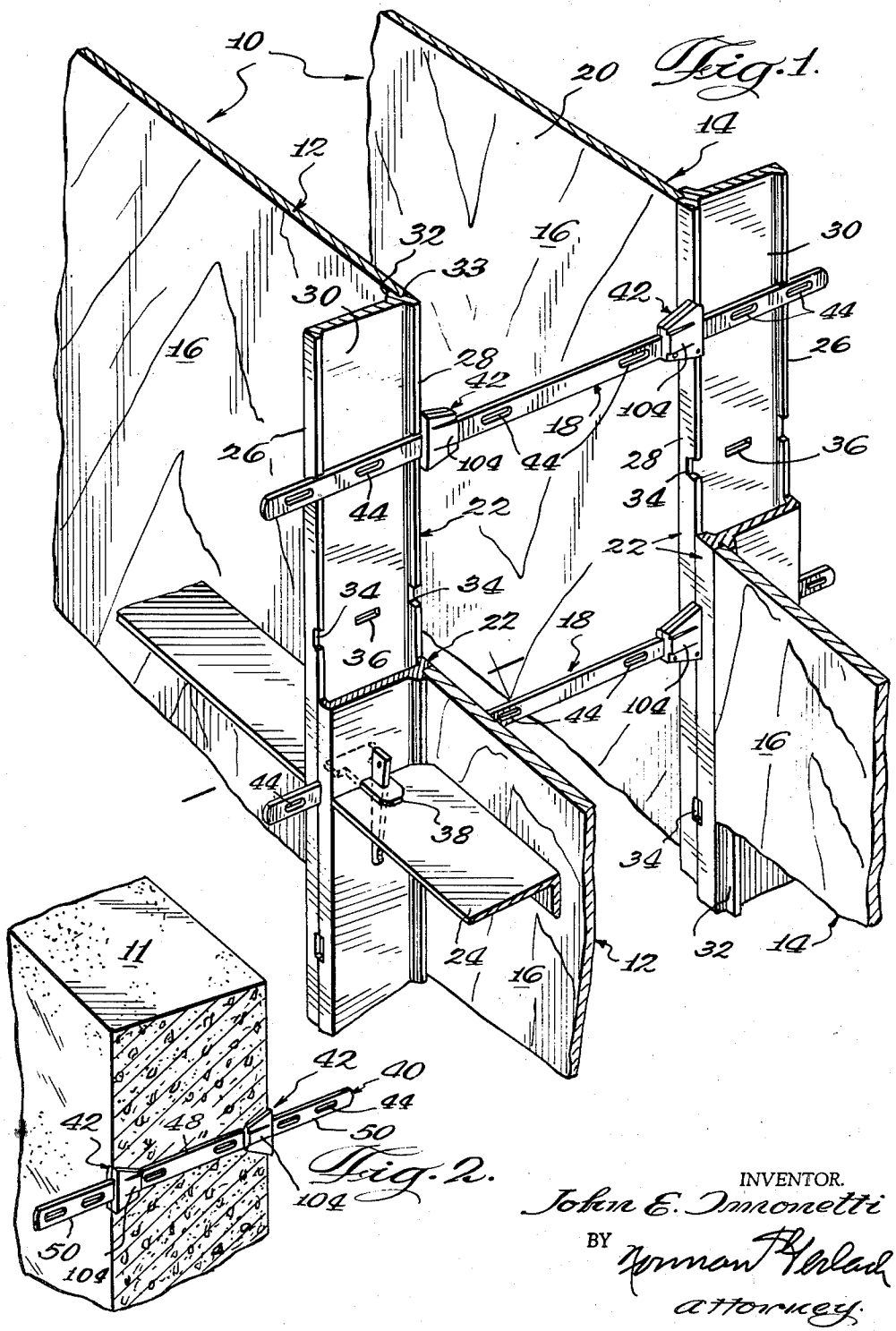


Fig. 1.

Fig. 2.

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TIE ROD ASSEMBLY FOR CONCRETE WALL FORMS AND CONE THEREFOR

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Fig. 3.

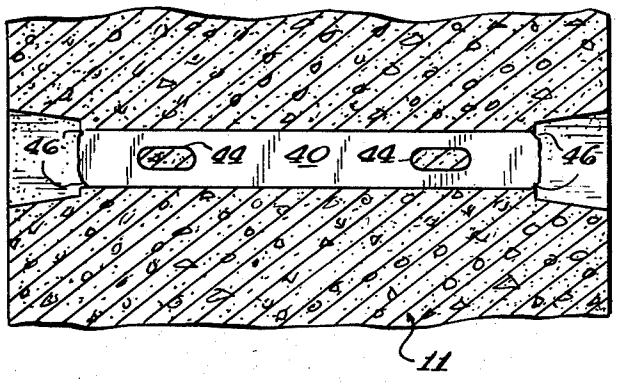


Fig. 4.

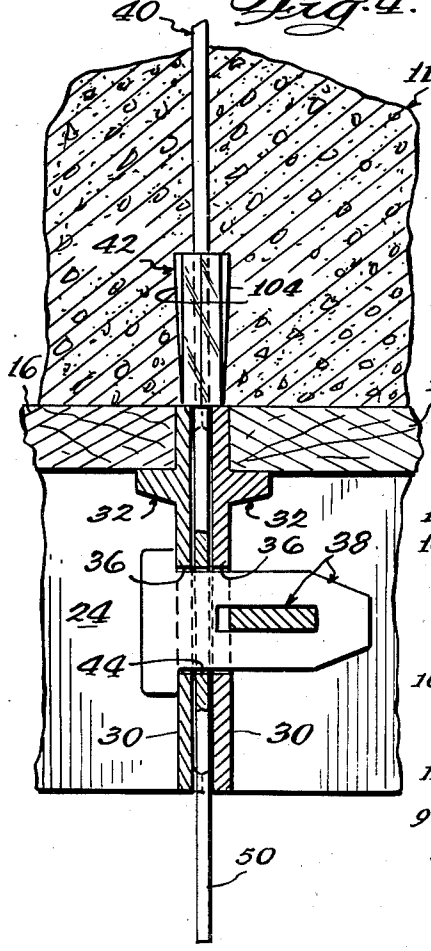


Fig. 5.

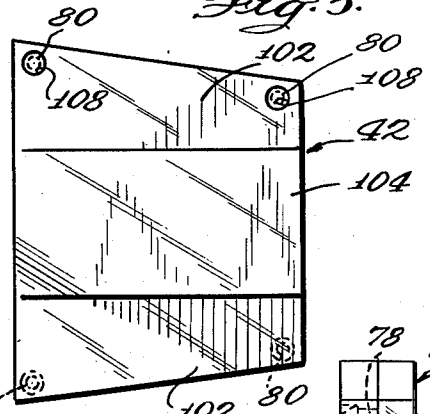


Fig. 6.

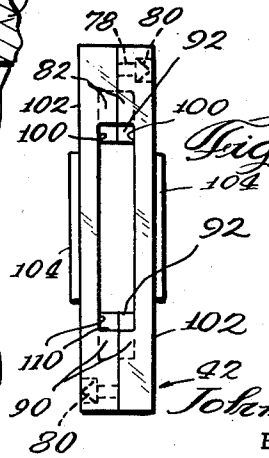
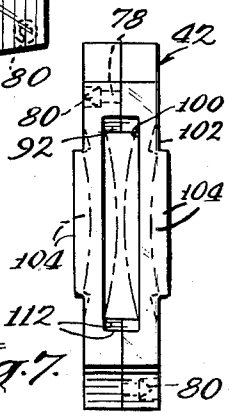


Fig. 7.



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TIE ROD ASSEMBLY FOR CONCRETE WALL FORMS AND CONE THEREFOR

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Fig. 9.

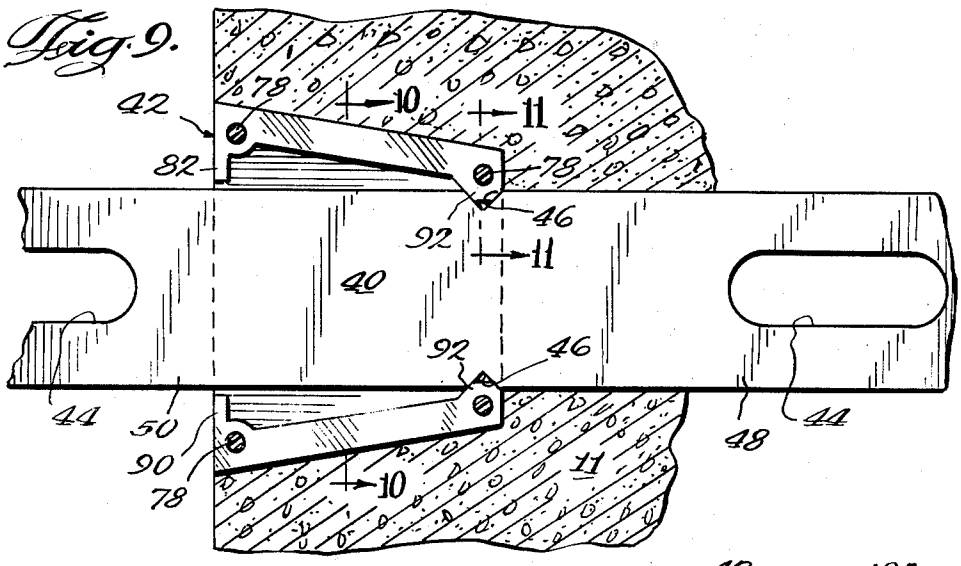


Fig. 8.

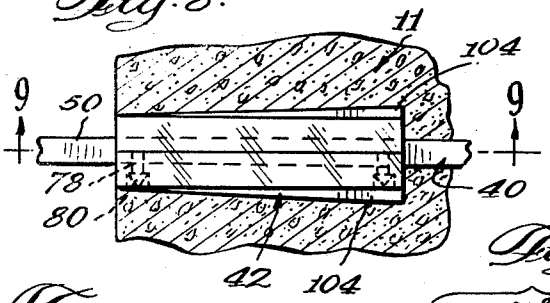


Fig. 11.

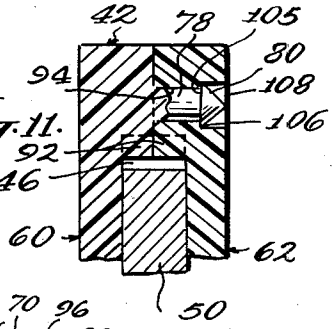


Fig. 13.

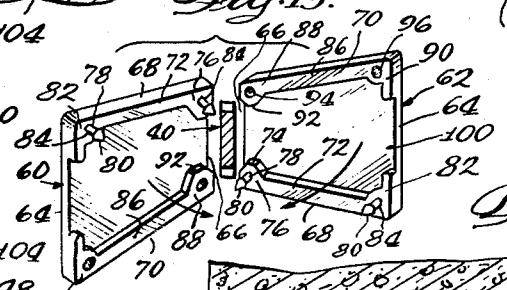


Fig. 10.

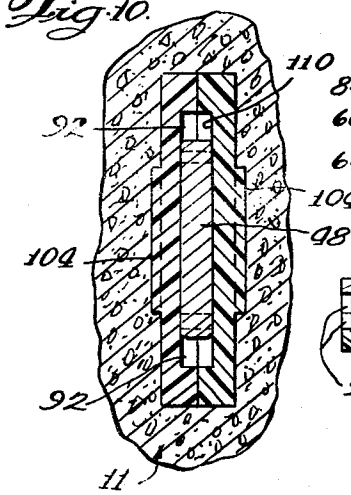
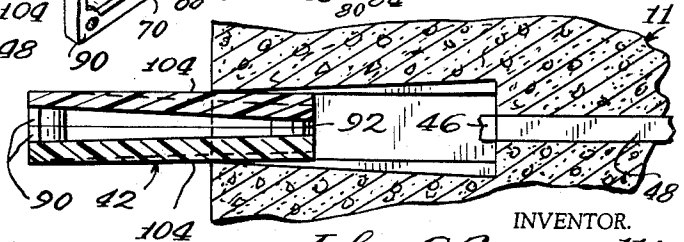


Fig. 12.



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2,948,045

TIE ROD ASSEMBLY FOR CONCRETE WALL FORMS AND CONE THEREFOR

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Filed Sept. 4, 1958, Ser. No. 759,094

7 Claims. (Cl. 25—131)

The present invention relates to tie rods for use in connection with concrete wall forms and the like and has particular reference to that type of tie rod which is designed for use in maintaining a pair of opposed wall forms in properly spaced relationship and in holding such forms against outward displacement during pouring of the concrete between the forms. Still more specifically, the invention is concerned with frangible tie rods of the general type shown and described in the patent to Symons, No. 2,580,330, dated December 25, 1951, for Tie Rod for Concrete Wall Forms wherein the tie rods project completely through the wall forms and intervening poured concrete so that after hardening of the concrete and removal of the forms the projecting ends of the tie rods may be bent, twisted or otherwise "worked" in various directions to weaken the metal of the rods at the regions where they enter the concrete and ultimately rupture or sever the projecting ends from the medial embedded portions of the rods.

It is common practice, in connection with such frangible tie rod constructions, to weaken the metal of the tie rod at regions which lie within the concrete mass so that after breaking away the ends of the rod as outlined above, the retained embedded portion of the rod will lie wholly within the concrete mass and present no protruding ends or otherwise create irregularities in the concrete wall surface to interrupt the continuity or smoothness thereof. To afford freedom of movement of the end portions of the rod which are to be broken away so that the same may be "worked" in various directions to effect the rupture, it is customary to surround the end portions of the rod in the vicinity of the weakened portions with a filler member, usually in the form of a cone which, when the concrete is poured, creates a void in the vicinity of the weakened portions of the rod so that when the concrete has hardened, the forms removed, and the cones withdrawn from their positions of partial embedment in the surface regions of the concrete wall, the voids constitute clearance regions for twisting, bending or otherwise working of the tie rod ends to effect the desired metal weakening and ultimate rupture of the tie rods.

Present day cones, which are designed for the purpose briefly outlined above, are possessed of numerous limitations among which are the inability of the cone to exclude concrete from the interior of the cone, the tendency for the cone to shift axially along the tie rod, either during handling before tie rod installation or after the tie rod has been installed and while the concrete is being poured, the necessity for initial assembly of the cones on the tie rod and the inability to assemble the tie rod and cones in the field at a scene of installation, and the relatively large amount of labor involved in withdrawing the cones from the hardened concrete and in thereafter grouting the large size voids which are left in the concrete after the cones have been withdrawn.

The present invention is designed to overcome the above-noted limitations that are attendant upon the construction and use of conventional cones, and toward this end, it contemplates the provision of a novel void forming device or "cone" which is in the form of a two-part separable assembly capable of being applied to a tie rod in the field at a scene of installation and which, when so applied, will fit snugly around the tie rod and closely hug the outer surfaces thereof so as to exclude concrete from the interior of the device. The invention further contemplates the provision of a cone which is formed of a suitable plastic material capable of being formed by a simple and inexpensive molding operation to provide a thin walled body which closely surrounds the tie rod and which, therefore, is of relatively small overall dimensions so that the void created thereby in the concrete is relatively small and requires little grouting.

The provision of a cone for tie rods possessing the features briefly outlined above being among the principal objects of the invention, another and important object is to provide such a cone which is comprised of a yieldable, flexible material which is capable of being deformed within the void which itself creates within the hardened concrete so that its overall dimensions may be reduced to a size smaller than the overall dimensions of the void, thereby facilitating withdrawal or extraction of the cone from the void without requiring special tools for concrete chipping or cone prying purposes.

A still further and equally important object of the invention, in a cone of this general character, is to provide a void-forming member which is comprised of two separate parts which, when assembled upon each other and about a tie rod in an operative manner so as to encompass or enclose the tie rod therebetween, will become effectively locked together against separation from each other or against dislodgment from the tie rod under conditions of normal force tending to separate the parts, the locking action taking place by virtue of a novel form of interengaging locking means associated with the two parts.

A similar and related object of the invention is to provide a two-piece frangible cone construction having additional and novel locking means for permanently retaining the assembled cone parts upon the tie rod against longitudinal shifting therealong during shipping, handling and concrete pouring operations.

Yet another object of the invention is to provide a cone having an external shape characteristic which is such that the void created thereby in the hardened concrete after the cone has been extracted from the concrete has an internal shape characteristic which is conducive toward retention of any grout or grout slug which may be employed for filling the void. In carrying out this last mentioned object, the invention contemplates the provision of a cone having dove-tail protuberances on the side surfaces thereof which, in the poured concrete, create a dove-tail socket in the concrete which, when grouted, prevents lateral withdrawal of the grout slug from the socket.

Numerous other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the following description ensues.

In the accompanying three sheets of drawings forming a part of this specification, a preferred embodiment of the invention has been 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 applied thereto;

Fig. 2 is a fragmentary perspective view, partly in section and on a reduced scale, showing a portion of a concrete wall structure produced by the form of Fig. 1 with one of the improved tie rod and cone assemblies in posi-

tion within the hardened concrete of the wall structure preparatory to fracture and removal of the tie rod ends;

Fig. 3 is a fragmentary sectional view taken vertically through the wall structure of Fig. 2 in the vicinity of one of the tie rod assemblies and showing the tie rod ends and cone devices removed from the wall structure;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 1 with the cone device being shown in plan elevation;

Fig. 5 is an enlarged side elevational view of the cone assembly of the present invention;

Fig. 6 is a rear end view of the structure shown in Fig. 5;

Fig. 7 is a front end view of the structure shown in Fig. 5;

Fig. 8 is a fragmentary horizontal sectional view taken through a portion of a concrete wall structure in the vicinity of one of the tie rod and cone assemblies;

Fig. 9 is a sectional view taken substantially along the line 9—9 of Fig. 8;

Fig. 10 is a sectional view taken substantially along the line 10—10 of Fig. 9;

Fig. 11 is a sectional view taken substantially along the line 11—11 of Fig. 9;

Fig. 12 is a fragmentary vertical sectional view of a portion of a concrete wall structure in the vicinity of one of the tie rods and illustrating schematically the manner in which the cone devices of the present invention are removed from the wall structure; and

Fig. 13 is a perspective exploded view of one of the cone assemblies of the present invention.

Referring now to the drawings in detail and in particular to Figs. 1 and 2, a fragmentary portion of a composite wall form of conventional construction has been illustrated herein and designated in its entirety at **10**. The wall form **10** is made up of two series **12** and **14** of rectangular panel units **16** with the units of each series being arranged in edge-to-edge relationship. The panel units **16** of the two series are maintained in spaced parallel relationship by means of combined spreader and tie rod assemblies **18**, two such assemblies being illustrated in Fig. 1 as being associated with two adjacent panel units of each series **12** and **14** in the production of a concrete wall **11**.

The individual panel units **16** selected for illustration herein are conventional in their design and no claim is made herein to any novelty associated with the same, the novelty of the present invention residing rather in the construction and design of the tie rod assemblies **18** and particularly in the construction and design of certain cone devices associated therewith, the nature and function of which will be described in detail presently. The illustrated panel units are of the prefabricated steel type, which is to say that they consist of rectangular plywood facings **20** having steel marginal rectangular reinforcing frames applied to the outer faces of the panels and consisting of vertical and horizontal frame bars, only the vertical frame bars **22** being illustrated herein. At appropriate levels in the form structure, suitable horizontal frame struts or bars **24** of angle shape design may extend across the panel unit between the opposed vertical frame bars **22**.

Specifically, the vertical frame bars **22** are in the form of structural steel members which are generally of shallow U-shape cross section, including spaced marginal parallel ribs **26** and **28** and a connecting base or web portion **30**. On the side of the web portion **30** opposite the ribs **26** and **28**, a shallow longitudinally extending rib **32** defines an angular groove or recess **33** for reception therein of the extreme vertical edge region of the plywood panel facing **20**. The horizontal frame members **24** are welded to the inside faces of the vertical frame bars **22**. At vertically spaced regions along the vertical frame bars **22** the ribs **26** and **28** are notched as at **34** to accommodate the tie rod assemblies **18**, while the web portions **30** of the bars **22** are formed with rectangular openings **36** in horizontal register with the notches **34** for reception therethrough of conventional connecting bolt and wedge assemblies **38** by means of which adjacent panel units are fastened together, all in a manner that will be made clear presently.

Still referring to Figs. 1 and 2, each combined spreader and tie rod assembly **18** is comprised of a tie rod proper **40** and a pair of composite cones **42**. Although the devices **42** do not present a conical appearance, they function in their broadest aspect in the manner of conventional devices which have become known in the art as tie rod "cones." For this reason, throughout this specification and in the claims appended thereto, the term "cone" will be employed to designate these composite devices.

Actually, the devices have an outside or overall configuration which is generally flat with relatively large approximately flat side surfaces and with relatively small truly flat end surfaces. Geometrically, they may be defined in various terms, depending upon whether the definition is based upon three dimensional geometry according to Euclid, Proclus, or other non-Euclidean geometry. These devices are hexahedrons with two faces thereof being in the form of rectangles. All four rectangular faces are truly flat, while the two trapezoidal faces are flat except for the provision of ribs thereon. Specifically, these devices **42** may be defined as hexahedral trapezohedrons, or in more general terms, as trapezoidal hexahedrons, this latter definition being based upon the fact that the devices have six faces, of which four of them are trapezoidal.

The tie rod proper **40** is in the form of a length of flat sheet metal stock of rectangular cross section and of a longitudinal extent appreciably greater than the overall width of the spaced series of wall form panels **12** and **14**. A series of spaced slots **44** are provided along the rod for selective register with the openings **36** in the web portions **30** of the vertical frame bars **22** when the form is assembled. As best seen in Fig. 9, at regions which are spaced inwardly from the opposite ends of the tie rod **40** and which, when the tie rod is in actual use within a concrete wall structure, are disposed within the confines of the poured concrete, the metal of the tie rod is relieved by the provision of respective pairs of opposed notches **46**, thus weakening the tie rod at these regions. The notches **46** thus, in effect, divide the tie rod **40** into three sections, namely, a medial section **48** and two end sections **50** (see also Fig. 2), the medial section constituting a fixed section which is adapted to remain embedded in the hardened concrete of the wall structure **11** and the end sections constituting free sections adapted to be removed by fracturing the tie rod along transverse lines extending across the notches **46** of the opposed pairs of notches in a manner that will be set forth presently.

The devices **42** are adapted to be applied to the tie rods either at the factory or in the field prior to setting up of the concrete wall form and, when in position on the tie rod, they assume positions wherein they span longitudinal extents on the rod sections **50** extending from the respective pairs of notches to the regions where the rod sections **50** emerge from the surfaces of the wall structure **11**. These cone devices serve the multiple functions of providing outwardly facing shoulders which engage the opposed wall form panel assemblies and limit their inward collapse during erection of the forms, of creating voids in the concrete which, after the forms have been removed but prior to extraction of the pliable or deformable cones, afford clearance pockets for "working" of the rod sections **50** in various directions so that the metal of the rod may be fractured along lines of cleavage preparatory to removal of the rod sections **50**.

Referring now to Figs. 9 to 13, inclusive, each cone device **42** is comprised of two identical parts which, for convenience of description, may be referred to as a left

part 60 and a right part 62. The parts 60 and 62 are preferably formed of a suitable plastic, such as a polyethylene polymer which is possessed of an appreciable degree of tensional and compressional resistance, yet which has some degree of flexibility so that when shaped to produce the parts 60 and 62, it may be flexed under the application of manual pressure thereto for cone extraction purposes in a manner that will become clear presently.

Each part 60 or 62, as the case may be, is in the form of a generally flat sheet of the polyethylene polymer and is generally in the form of a symmetrical trapezoid having large and small bases 64 and 66 respectively, and equally inclined sides 68 and 70, these various sides of the trapezoid representing the peripheral edges of the part. Extending along the edge 68 and coextensive with the latter is a raised marginal flange 72. The flange 72 is formed adjacent the small base or edge 66 with an inwardly extending protuberance 74 which affords a thickened portion 76 on the flange, and a cylindrical post 78 (Fig. 11) projects laterally outwardly from the medial region of this thickened portion. The post is provided with an enlarged conical head portion 80. The flange 72 is formed adjacent the large base 64 of the trapezoid with a thickened region 82, from which there extends laterally a similar post 84, likewise having a conical head portion 80. Extending along the edge 70 and coextensive therewith is a raised marginal flange 86 having thickened portions 88 and 90 at the ends thereof adjacent the small and large bases 66 and 64 of the trapezoid respectively. The thickened portion 88 provides an inwardly extending protuberance 92 which transversely and directly opposes the protuberance 74. The thickened portions 88 and 90 have formed therethrough respective holes 94 and 96 designed for reception therein of the posts 78 and 84 when the two parts 60 and 62 are assembled upon each other.

As best seen in Figs. 5, 6 and 7, each part 60 or 62, as the case may be, affords an inside face 100 and an outside face 102, the outside face being formed with a raised, longitudinally extending rib 104 which, as shown in Fig. 8, tapers from the small base 66 of the trapezoid toward the large base 68 thereof and fades into the material of the outside face 102 at a region in close proximity to the small base 64.

The two identical parts 60 and 62 are thus generally of shallow channel-shaped cross section and they are adapted to be assembled upon each other to produce open-ended, generally tubular, cone structure 42. In the production and distribution of the tie rod assemblies 18, the tie rods 40 and the separate parts of the cone devices 42 may be furnished by the manufacturer individually, i.e., separately, or these elements may be furnished in completely assembled form with two of the assembled cone devices positioned on a tie rod. If the elements are separately furnished, the cone devices 40 which consist of the two parts 60 and 62 will, of course, be assembled in the field over the tie rod to produce the tie rod unit 18 as it appears in Figs. 1 and 2. In either event, whether the cone devices be assembled on the tie rod proper by the manufacturer at the factory, or whether the parts be assembled by the consumer in the field, the parts 60 and 62 are caused to straddle the medial region of the tie rod proper 40 with the inside faces 100 thereof disposed in opposition, with the large bases 64 in contiguity, with the small bases 66 in contiguity, and with the flange 72 of each part contiguous to the flange 86 on the other part. Thereafter, the parts are moved toward each other as indicated by the arrows in Fig. 13 so that the posts 78 enter the holes 96 and the posts 84 enter the holes 94. It is to be noted at this point that each of the conical enlargements 80 at the outer ends of the various posts affords an annular shoulder 105 (Fig. 11) which seats against a mating annular shoulder 106 disposed at the bottom of a countersunk recess or socket 108 associated with each of the holes 94 and 96. The depth of the socket 108 is such that the conical enlargement 80 is adapted to be wholly confined within the confines of the socket when the posts are fully received through the various holes provided for them. During such movement of the two parts 60 and 62 toward each other preparatory to effecting the assembly, the inwardly extending opposed protuberances 74 are maintained in transverse register with one of the pairs of opposed notches 46 so that when the parts are finally moved to their home positions, one upon the other, these protuberances engage the notches as shown in Fig. 9 and securely lock the assembly 42 against longitudinal shifting along the tie rod proper 40 in either direction.

When the parts 60 and 62 are assembled upon a tie rod, the outer faces of the flanges 72 and 86 meet each other in face-to-face contact and, in combination with the wall surfaces 100, define at the large base of the trapezoidal hexahedron a rectangular opening 110 of approximately the same dimensions as the cross sectional dimensions of the tie rod proper 40. Similarly, at the small base of the trapezoidal hexahedron, these flanges, 72 and 76, in combination with the wall surfaces 100, define a rectangular opening 112 of similar width but of slightly greater length than the transverse width of the tie rod 40. The tie rod 40 passes through the two openings 110 and 112 and, because the length of the opening 112 is slightly greater than the width of the tie rod 40, a clearance region is provided which permits limited freedom of swinging motion of the two frangible end sections 50 of the tie rod 40 relative to the medial section 48 during working of the sections for metal-fracturing purposes.

In assembling the form 10, the various panel sections 12 and 14 are erected in their edge-to-edge relationship and the tie rods proper 40, with the two cone devices 42 assembled thereon, are positioned in the various horizontally aligned notches 34 as shown in Fig. 1. The panel sections are brought to bear against the outwardly facing shoulders afforded by the large bases of the cone devices and the bolt and wedge assemblies 38 are inserted through the various registering holes 36 to lock the panels in position in the usual manner of erection of such forms. Thereafter, the concrete is poured and when the latter has hardened or become set, the assemblies 38 are removed and the forms disassembled, thus leaving the tie rod assemblies partially embedded in the concrete wall structure 11 as clearly shown in Fig. 2, with the end sections 50 protruding from the wall. Thereafter, by manually engaging the end sections 50 and working the same in a vertical plane back and forth, the metal of the tie rods proper 40 will become fractured along transverse lines of cleavage passing through the opposed notches 46 (Fig. 1) so that the ends of the sections 50 may be inserted from the medial section 46 and slid longitudinally from the interior of the assembled cone devices 18, thus leaving the medial sections 48 embedded in the concrete of the wall 11. It is to be noted at this point that an extremely small angular displacement of the end sections 50, out of alignment with the medial sections 48, will suffice to effect the desired fracture. Clearance for this small displacement may be afforded by the looseness or "play" afforded between the protuberances 92 and the notches 46 with which they are in mating register, and such clearance may also be afforded by the resiliency of the plastic material of the sections 60 and 62 and its ability to yield slightly under the application of compressional, tensional and torsional stresses applied thereto. It is also to be noted that because the flat ends of the trapezoidal structures at the large bases thereof fit in firm face-to-face contact with the vertical side edges of the vertical frame bars 22, the wet concrete is prevented from entering the bore afforded by the mating sections or parts 60 of the devices 18.

After the end sections **50** have been removed as set forth above, the assembled sections **60** and **62** may be bodily withdrawn from the voids created by their presence in the poured concrete of the wall **11**. Extraction of the devices **18** may be effected by engaging a suitable tool such as a hook behind one or both of the lips afforded by the thickened portions **82** and **90**, and thereafter, exerting outward pulling force on the devices so as to slide them outwardly from the voids. The tapered ribs **104** which give a dove-tail configuration to the trapezoidal structure in transverse cross section, function as cam members during withdrawal of the devices **18** from the voids so that as the devices are slid progressively outwardly from the voids, the large base region of the trapezoidal structure is compressed as shown in Fig. 12 and is caused to assume a transverse dimension sufficiently small that mouth or rim of the void in the concrete will not bind against the device and prevent its withdrawal from the void. In other words, the combined thicknesses of the walls of the sections **60** and **62** at their regions of greatest thickness near the small base of the trapezoidal hexahedron structure, and including the maximum thicknesses of the tapered ribs **104**, is less than the transverse width of the mouth of the void created within the concrete structure by virtue of the existence of the assembled device **18** on the tie rod proper **40**. When the device **18** is removed in this manner, the assembly of the two sections **60** and **62** remains intact and the device is capable of being reused in a subsequent concrete form installation, it being merely necessary to pull, pry or otherwise separate the sections **60** and **62**, each from the other, and to reapply them over a fresh tie rod proper.

Finally, it is to be noted that the tapered ribs **104**, in addition to serving their function as cam members whereby the device as a whole will be automatically contracted during extraction of the same from the void in the concrete structure **11** as outlined above, impart to the void a dove-tail configuration in horizontal cross section which serves to prevent dislodgment of any grout slug which may be introduced into the void to preserve the smooth continuity of the outside wall surfaces.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification since various changes in the details of construction may be resorted to without departing from the spirit of the invention. Only insofar as the invention has particularly been 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. In a tie rod assembly for holding a pair of upstanding concrete wall forms in spaced relationship, said assembly comprising in combination a one-piece strip of flat metal stock presenting straight parallel longitudinally extending side edges, one of said side edges being provided at a region spaced inwardly from one end of the strip with a notch the existence of which establishes a reduction in the transverse width of the strip and a consequent weakening of the metal of the strip in said inwardly spaced region, thus dividing the strip into a fixed section adapted to remain at least in part embedded in the concrete which is poured between the wall forms and a free section adapted to project at least in part outwardly from one face of the poured concrete, and be wrested from the fixed section by working of the free section bodily back and forth in the general plane of the flat metal stock, and a tubular cone encompassing said region of the strip and extending a short distance longitudinally from said region toward said one end of the strip, said cone having extreme end regions closely hugging the sides of the strip to exclude concrete from the interior of the cone, said cone being formed with a longitudinal bore therethrough through which the strip extends, and an inwardly projecting protuberance on the wall of said bore extending into said notch and serving to prevent longitudinal shifting movement of the cone on said strip, said tubular cone being in the form of a generally flat hexahedron having symmetrical trapezoidal side faces extending parallel to the general plane of the metal stock of said strip, rectangular end faces extending normal to the general plane of the metal stock of said strip, and rectangular top and bottom faces which converge relative to each other and which extend at an acute angle to the longitudinal axis of the strip, said cone being disposed on said strip with the large base of said trapezoidal side faces being positioned next adjacent to said one end of the strip, and a tapered rib formed on one of said side faces and extending longitudinally of the cone, said rib increasing in thickness toward the end thereof adjacent the end of the cone remote from said one end of the strip.

2. In a tie rod assembly for holding a pair of upstanding concrete wall forms in spaced relationship, said assembly comprising in combination a one-piece strip of flat metal stock presenting straight parallel longitudinally extending side edges, said side edges being provided at a region spaced inwardly from one end of the strip with a pair of transversely opposed notches the existence of which establishes a reduction in the transverse width of the strip and a consequent weakening of the metal of the strip in said inwardly spaced region, thus dividing the strip into a fixed section adapted to remain at least in part embedded in the concrete which is poured between the wall forms and a free section adapted to project at least in part outwardly from one face of the poured concrete and be wrested from the fixed section by working of the free section bodily back and forth in the general plane of the flat metal stock, and a two-piece separable cone encompassing said region of the strip and extending a short distance longitudinally from said region toward said one end of the strip, said cone being comprised of two similar cone parts, each being of shallow channel shape cross section and having a flat web portion with marginal inwardly converging flanges, the flanges of each cone part contacting the respective flanges of the other cone part in edge-to-edge relationship when the parts are assembled, said flanges and web portions degfining therebetween a longitudinally extending bore through which said strip extends, at least one of the flanges on each cone part being formed with a protuberance extending into one of the notches and serving to prevent longitudinal shifting of the cone on said strip, and upstanding posts on one of each pair of contacting flanges, the other flange of said pair being formed with holes in which said posts are frictionally received.

3. In a tie rod assembly, the combination set forth in claim 2 wherein each post is provided with a tapered enlargement at its extreme outer end providing an inwardly facing annular shoulder, said holes being formed with countersunk sockets having annular bottom walls, said enlargements being received in and wholly contained by said sockets with said annular shoulders seating on said bottom walls when the parts are assembled.

4. In a tie rod assembly for holding a pair of upstanding concrete wall forms in spaced relationship, said assembly comprising in combination a one-piece strip of flat metal stock presenting straight parallel longitudinally extending side edges, said side edges being provided at a region spaced inwardly from one end of the strip with a pair of transversely opposed notches the existence of which establishes a reduction in the transverse width of the strip and a consequent weakening of the metal of the strip in said inwardly spaced region, thus dividing the strip into a fixed section adapted to remain at least in part embedded in the concrete which is poured between the wall forms and a free section adapted to project at least in part outwardly from one face of the poured concrete and be wrested from the fixed section by working of the free section bodily back and forth in the general plane of the flat metal stock, and a two-piece seperable

cone encompassing said region of the strip and extending a short distance longitudinally from said region toward said one end of the strip, said cone being comprised of two similar cone parts, each being of shallow channel shape cross section and having a web portion with marginal flanges, the flanges of each cone part contacting the respective flanges of the other cone part in edge-to-edge relationship when the parts are assembled, said flanges and web portions defining therebetween a longitudinally extending bore through which said strip extends with the inside faces of said web portions in face-to-face contact with the side faces of said flat metal strip, the outside face of each web portion being formed with a tapered raised rib thereon extending longitudinally of the cone, said rib increasing in thickness toward the end thereof next adjacent said one end of the strip, the combined thicknesses of the two ribs at the ends of greater thickness being less than the combined thicknesses of the web portions and of the metal stock of the strip at the end of the cone next adjacent said one end of the strip, at least one of the flanges on each cone part being formed with a protuberance extending into one of said notches and serving to prevent longitudinal shifting of the cone on said strip, and interengaging means on said cone parts for releasably maintaining the same in their assembled relation.

5. In a tie rod assembly, the combination set forth in claim 4 wherein said interengaging means comprises upstanding posts on one of each pair of contacting flanges, the other flange of such pair being formed with holes therein in which said posts are frictionally received.

6. In a tie rod assembly, the combination set forth in claim 4 wherein said cone is of overall trapezoidal cross section in the general plane of said flat strip of metal stock with the large base of the trapezoid being remote from said one end of the strip, and wherein the cone is of overall trapezoidal cross section in a plane normal to the general plane of said flat strip with the large base of the trapezoid being next adjacent to said one end of the strip.

7. In a tie rod assembly, the combination set forth in claim 4 wherein the cone parts are each formed of resilient flexible material and wherein said interengaging means comprises upstanding posts on one of each pair of contacting flanges, the other flange of said pair being formed with holes therein in which said posts are frictionally received, a tapered enlargement at the outer end of each post, and means in the vicinity of each hole defining a shoulder having releasable interlocking engagement with one of said enlargements.

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