United States Patent [19]

Becker

[11] **3,880,397**

[45] **Apr. 29, 1975**

[54] **BOWED TIE ROD WITH DEFORMABLE CONE MEANS**

[75] Inventor: **Donald E. Becker**, Kenosha, Wis.

[73] Assignee: **Becker, Inc.**, Kenosha, Wis.

[22] Filed: **July 16, 1973**

[21] Appl. No.: **379,681**

[52] **U.S. Cl.** **249/214**; 249/46

[51] **Int. Cl.** **E04g 17/08**

[58] **Field of Search** ..... 249/40–41, 249/43, 46, 190–191, 213–214, 216–217, 219 W

[56] **References Cited**

UNITED STATES PATENTS

2,898,659	8/1959	Shoemaker	249/219 W
2,967,689	1/1961	Jahn	249/219 W
3,013,323	12/1961	Williams	249/217
3,235,217	2/1966	Jahn	249/219 W
3,638,904	2/1972	Franklin et al.	249/40
3,693,931	9/1972	Holt	249/46
3,729,166	4/1973	Buyken et al.	249/190
3,746,297	7/1973	Daniels, Jr.	249/214

Primary Examiner—Robert D. Baldwin
Assistant Examiner—John McQuade
Attorney, Agent, or Firm—Arthur L. Morsell, Jr.

[57] **ABSTRACT**

The end of a snappable concrete form tie rod extends through an opening in a concrete form panel. The tie rod has a weakened portion at which its end may be snapped off after the concrete has hardened. The end of the tie rod is flattened adjacent to the head thereof, one end of the flattened portion forming a shoulder which engages a bracket for holding the tie rod in position. The flattened portion may be engaged by a wrench for applying torque to the end of the tie rod to snap it off. A cone member is positioned on the tie rod between the weakened portion and the head. The cone member has a central opening extending lengthwise therethrough which is somewhat larger in diameter than the tie rod for slideably receiving the same. The tie rod has an outwardly bowed portion between the weakened portion thereof and the head to bind the cone member in a predetermined position on the tie rod.

3 Claims, 5 Drawing Figures

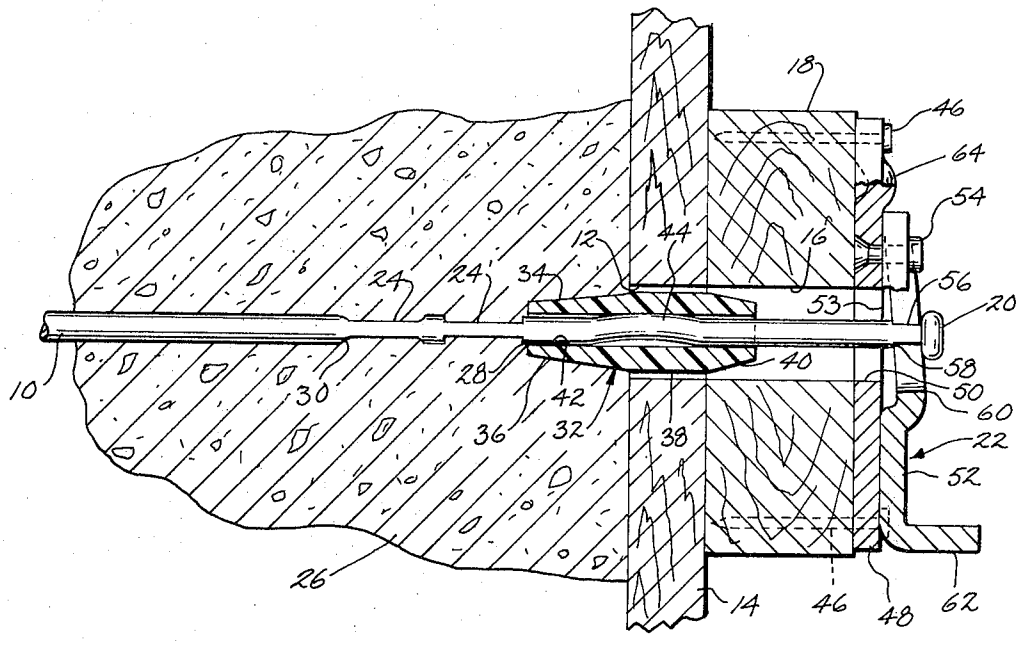


Fig. 1

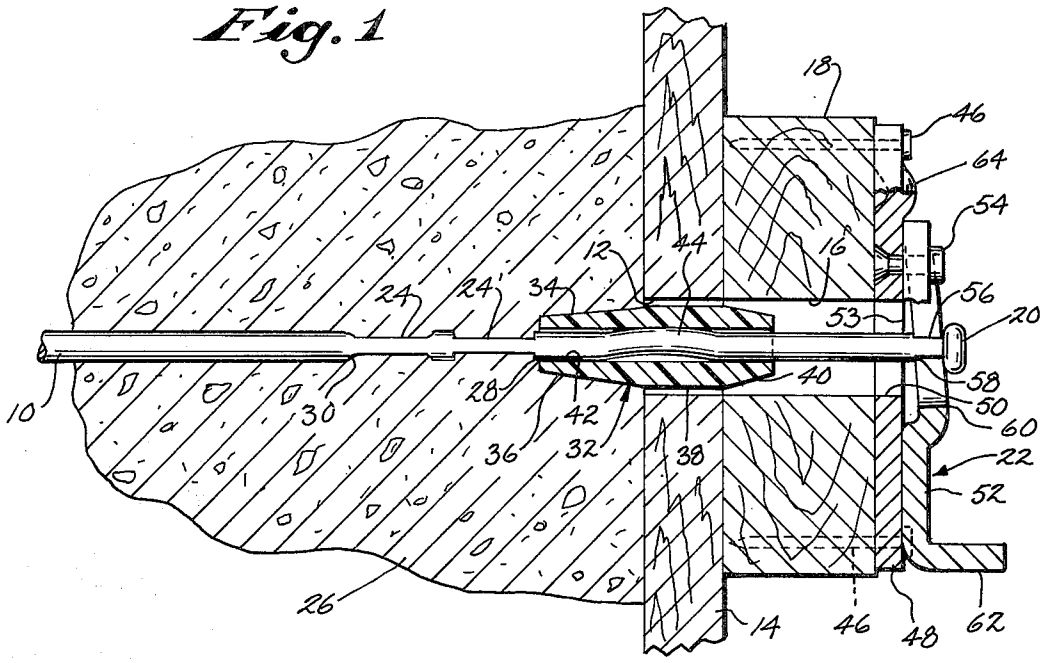


Fig. 2

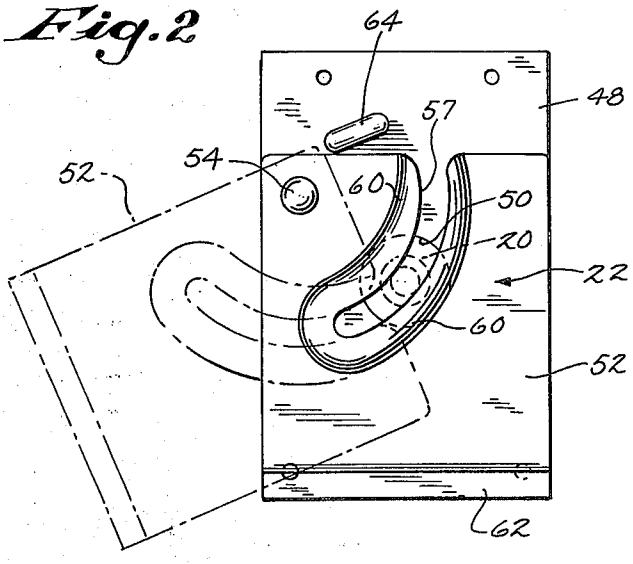


Fig. 3

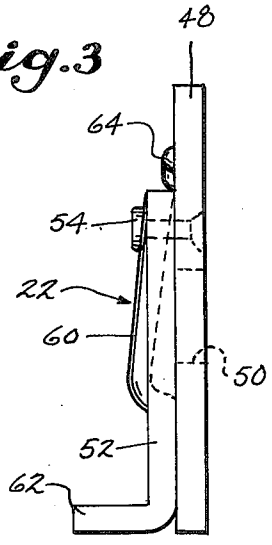


Fig. 4

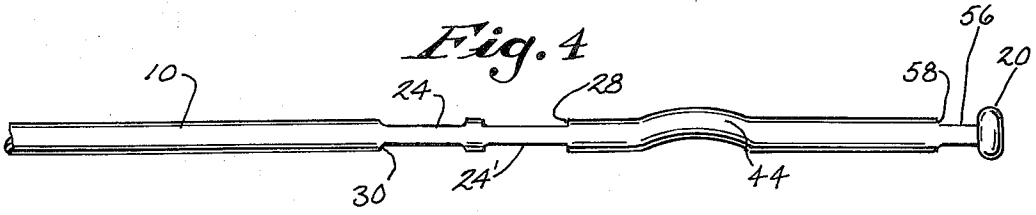
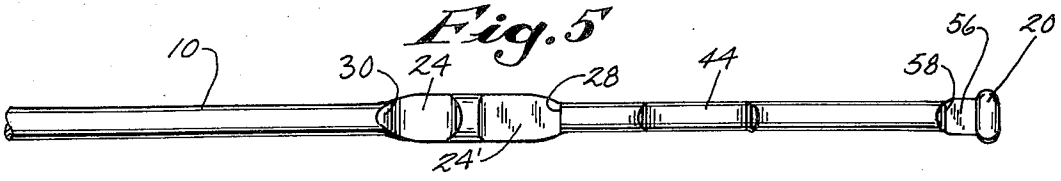


Fig. 5



BOWED TIE ROD WITH DEFORMABLE CONE MEANS

BACKGROUND OF THE INVENTION

This invention relates to snappable concrete form tie rods which are used to hold the sides of a concrete form together while the concrete therein is hardening and are then snapped off at the ends after the concrete has hardened. A typical prior art tie rod is disclosed in U.S. Pat. No. 3,729,166 which was issued on Apr. 24, 1973 to Buyken et al. This prior art tie rod has a weakened portion or breakback **22** at which the end of the tie rod may be snapped off by applying a torque thereto. A flat-sided flangelike member **50** is attached to the tie rod near the point where it passes through an opening in the form panel. To break the end of the tie rod off, a tubular wrench **60** is inserted over the end of the tie rod until it engages the flat sides of the flangelike member **50.** The tubular wrench is then turned until the tie breaks off at the weakened point **22.**

The above-described prior art tie rod has several serious drawbacks. In the first place, a special tubular wrench is required for snapping off the ends of the tie rod. Next, wet concrete may leak out over the flat-sided flangelike member **50,** and after such concrete hardens, the tubular wrench may not engage the flattened sides of the flangelike member **50,** and the tie rod cannot be snapped off until the leaked concrete has been laboriously chipped away. In addition, a special cover is required on the bracket which engages the head of the tie rod to prevent the tie rod from moving outwardly. Finally, the process of attaching the flat-sided flangelike member **50** to the tie rod is relatively expensive, since the rod has to be bulged to provide an annularly swelled portion which fills a square hole within member **50** to couple it to the tie rod.

SUMMARY OF THE INVENTION

In accordance with this invention, the abovenoted drawbacks are eliminated by a novel tie rod which has shoulders near the ends thereof for engaging brackets to hold the tie rod in position and which has flattened portions between the shoulders and the rod heads positioned for convenient engagement by a standard wrench to provide a torque for snapping the ends of the tie rod off at weakened regions thereof. In the preferred embodiment, the shoulders are formed by the inner boundary of the flattened portion. The tie rod is bowed in a location between each weakened region and the shoulders, with said bowed portion serving to hold a cone member in predetermined position on the tie rod to form conical openings in the concrete wall around the ends of the tie rod.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary cross-sectional view of a concrete form showing one end of a concrete form tie rod of this invention;

FIG. **2** is a plan view of a bracket for holding the end of the concrete form tie rod in place while the concrete hardens;

FIG. **3** is a side view taken on the line 3—3 of FIG. **2**;

FIG. **4** is a top view of one end of the tie rod shown in FIG. **1**; and

FIG. **5** is a side view of the tie rod shown in FIGS. **1** and **4.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** shows one end of a tie rod **10** of this invention extending through an opening **12** in a concrete form panel **14** and also extending through an opening **16** in a waler **18** adjacent to panel **14.** The tie rod **10** has an opposing end (not shown) which passes through an opposing concrete form panel (not shown) and waler (not shown) on the opposite side of the concrete form. However, since the two ends are identical in form and in function, only one end will be described herein, it being understood that the description applies to both ends of the tie rod **10.** Also, there is a plurality of tie rods extending between the two form panels but they are all identical and only one will be described herein.

The tie rod **10** has a head **20** formed on its outer end, the head **20** being engaged in a locking bracket **22** which will be described hereinafter. The tie rod **10** has spaced flattened portions **24** and **24'** to anchor the rod **10** against rotation within the concrete **26** and also to provide a weakened portion at which the end of the tie may be snapped off. The outermost end of flattened portion **24'** has a squared corner **28** which weakens the tie rod **10** at that point so that it may be snapped off after the concrete has hardened, in response to a torque applied to the end of the tie rod **10.** The flattened portion **24** keeps the main portion of the length of the tie rod **10** from rotating when the torque is applied to snap the end off. The innermost end of the flattened portion **24** has a rounded corner **30.**

A cone member **32** is mounted on tie rod **10** adjacent to the weakened portion **28.** The cone member **32** has a conically shaped portion **34** which extends through the panel **14** around tie rod **10.** The conically-shaped portion **34** of cone member **32** molds a conically-shaped opening **36** in the concrete wall which is cast within the form. After the end of the tie rod **10** has been snapped off at **28,** this conically shaped opening **36** may be filled with concrete or it may be left open as a decorative feature.

The cone member **32** has a cylindrical portion **38** which is in the opening **12** in form panel **14,** and also has four fins **40** which extend within the opening **16** in waler **18.** The conical portion **34,** cylindrical portion **38,** and fins **40** are adjacent parts of an integral cone member **32** which is preferably made of a relatively deformable plastic material such as polyethylene, polystyrene, neoprene, or the like. A longitudinal opening **42** which has a somewhat larger diameter than tie rod **10** is formed in cone member **32** for slideably receiving the tie rod **10.** Cone member **32** is slid on tie rod **10** before the head **20** is formed on the tie rod. In accordance with this invention, the tie rod **10** is formed with an outwardly bowed portion as at **44** (see FIGS. **4** and **5**) so as to bind within the opening **42** to hold the cone member **32** in the proper position on tie rod **10.** When the cone member **32** is slid on tie rod **10,** it is forced over the bowed portion **44** to the position shown in FIG. **1,** the deformable material of cone **32** allowing the larger diameter central opening **42** thereof to deform enough to accept the bowed portion **44** but not enough to prevent the bowed portion **44** from binding within the opening **42** to hold the cone member **32** in position.

As shown in FIG. **1,** the cylindrical portion **38** of cone member **32** is slightly smaller in diameter than the opening **12** in panel **14** but not small enough to permit

wet concrete to flow around it. Thus the cylindrical portion **38** acts as a plug within opening **12.**

A bracket **22** for holding the end of tie rod **10** in position is attached to waler **18** by means of nails **46.** A plan view of bracket **22** is shown in FIG. **2** and a side view is shown in FIG. **3.** Referring to FIGS. **1–3,** the bracket **22** includes a base plate **48** which has corner openings for receiving the nails **46** and a central opening **50** for receiving the end of tie rod **10.** A slotted cam plate **52** is swingably attached to base plate **48** by a rivet **54.** Cam plate **52** has an arcuate slot **56** therein (see FIG. **2**) for embracing the end of tie rod **10.**

In accordance with this invention, the end of tie rod **10** immediately inward of head **20** is flattened at **56** (see FIGS. **4** and **5**) so that the inner margin of the flattened portion provides a shoulder **58** for preventing outward movement of tie rod **10.** The flattened surface **56** is conveniently located to be engaged by a wrench to apply a torque to the end of tie rod **10** when it is desired to break the tie rod off at weakened portion **28.** As shown in FIG. **1,** the shoulder **58** is located to bear against the inner side **53** of cam plate **52** adjacent to the slot **57** (see FIG. **2**), which slot is made narrower than the diameter of tie rod **10,** but wider than the flattened portion **56** thereof.

Arcuately-extending inclined cam surfaces **60** (see FIGS. **2** and **3**) are provided on opposite sides of the arcuate slot **57.** The slot **57** and cam surfaces **60** can be moved in a circular path by swinging the cam plate **52** about the rivet **54** as indicated by the dashed lines in FIG. **2.** The cam plate **52** can be moved to the position shown, where the inner surface of tie rod head **20** bears against the cam surface **60** and the inner surface **53** of cam plate **52** bears against the shoulder **58.** The engagement of cam surfaces **60** and head **20** prevent inward movement of tie rod **10** while the engagement of shoulder **58** and the inner surface **53** of cam plate **52** prevents outward movement of the tie rod **10.** It should be noted that the shoulder **58** could be formed by an enlarged or swelled portion of tie rod **10** if desired. However, it is more economical to use the inner edge **58** of the flattened portion **56** as a shoulder.

The use of the shoulder **58** to limit outward movement of tie rod **10** is an important feature of this invention. In the past, it has been necessary to double back the cam plate **52** over the outer surface of tie rod head **20** to limit its outward movement or use a shield such as the shield **38** of U.S. Pat. No. 3,729,166. In accordance with the present invention, however, a simple flange **62** may be formed on the bottom of cam plate **52** and the necessity of doubling the flange **62** back over tie rod head **20** is eliminated.

The swinging movement of cam plate **52** is limited by an embossed abutment **64** on base plate **48.** Abutment **64** is positioned as shown in FIGS. **2** and **3** to prevent the end of arcuate slot **56** from being driven against the flattened portion **56** of tie rod **10.**

In use, after the concrete **26** in the form has hardened, the cam plate **52** is swung away to expose the flattened portion **56** under tie rod head **20** so that said flattened portion may be engaged by a wrench or other suitable tool. Torque may then be applied to snap off the end of tie rod **10.** Referring to FIG. **2,** the flattened portion **56** is exposed by swinging the cam plate **52** in the clockwise direction about rivet **54.** It should be noted that the placement of flattened portion **56** on the end of tie rod **10** insures that it will be accessible even if concrete has leaked out of the form around the cylindrical portion **38** of cone member **32.** Also, the easily accessible position of the flattened portion **56** has the additional advantage that it can be grasped and turned by a standard adjustable wrench, and a special tubular wrench such as used in the prior art is not required.

I claim:

1. In a snappable concrete form tie rod having a head on at least one end thereof, and having a weakened portion spaced inwardly from said head whereby the end of the tie rod may be snapped off by applying a torque thereto, and having a cone member on said tie rod between said weakened portion and said head, the improvement wherein said cone member is constructed of deformable material and nas a longitudinally-extending bore therein which is somewhat larger in diameter than said tie rod, whereby said cone member may be freely slid along said tie rod until close to assembled position, a portion of the length of said tie rod being outwardly bowed between said weakened portion and said head while maintainingf the original diameter of the tie rod, with said outwardly-bowed portion positioned within said cone portion, and the deformable material of the cone allowing the larger diameter of its bore to deform enough to accept the bowed portion of the rod but not enough to prevent the bowed portion from binding within the bore to thereby releasably hold said cone member in final assembled position on said tie rod next to the weakened portion.

2. The improvement defined in claim **1** wherein the length of the outwardly-bowed portion is less than the length of the bore of the cone member.

3. The improvement defined in claim **1** wherein the binding engagement between the bowed portion of the tie rod and the bore of the cone is the sole means for releasably holding the cone against movement on the tie rod.

* * * * *