United States Patent

Franklin et al.

[15] **3,638,904**

[45] **Feb. 1, 1972**

[54] CONE ELEMENT FOR CONCRETE FORMS

[72] Inventors: **James W. Franklin,** Albuquerque, N. Mex.; **David R. Wells; Elmer H. Schell,** both of Westminster, Colo.

[73] Assignee: **Form-Eze Systems,** by said Wells

[22] Filed: **Apr. 14, 1969**

[21] Appl. No.: **827,443**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 563,011, June 11, 1966, Pat. No. 3,482,813, Continuation-in-part of Ser. No. 511,480, Dec. 3, 1965.

[52] **U.S. Cl.** **249/213,** 249/40

[51] **Int. Cl.** **E04g 17/06**

[58] **Field of Search** 249/38, 42, 43, 45, 46, 1, 249/189, 190, 191, 196, 210, 213, 214, 215–219, 40

[56] **References Cited**

UNITED STATES PATENTS

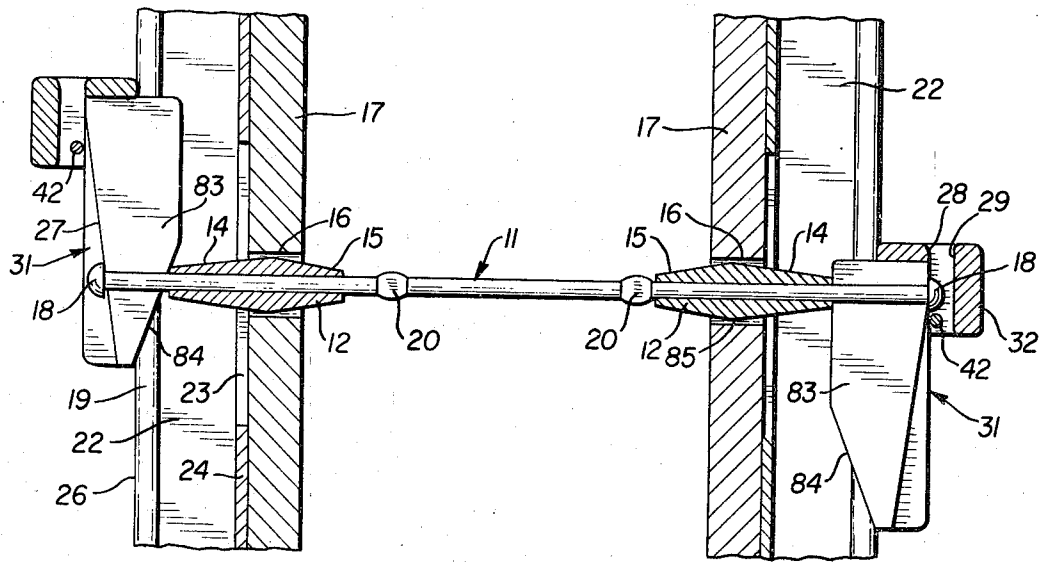
2,098,686	11/1937	Holm	249/217
2,168,990	8/1939	Hungerford	249/216 X
2,728,127	12/1955	Armstrong	249/215
3,343,771	9/1967	Gates	249/219 X
3,415,484	12/1968	Klaiss	249/216

Primary Examiner—J. Spencer Overholser
Assistant Examiner—John S. Brown
Attorney—C. B. Messenger

[57] **ABSTRACT**

A cone-type device for use with form ties in concrete-forming systems to prevent escape of concrete and to facilitate form tie placing and form spacing operations. A cone device of size slightly smaller than the size of tie openings in the form elements is disposed on a form tie and is provided with a tapered end to facilitate introduction of said cones through the openings in the forms whereby the ties may be emplaced from a work station outside the form structure. The cone device is further used cooperatively with a form tie and a form lock as a spacer component to maintain accurate spacing of the form walls before concrete is poured notwithstanding its freedom from engagement with the form walls.

5 Claims, 7 Drawing Figures



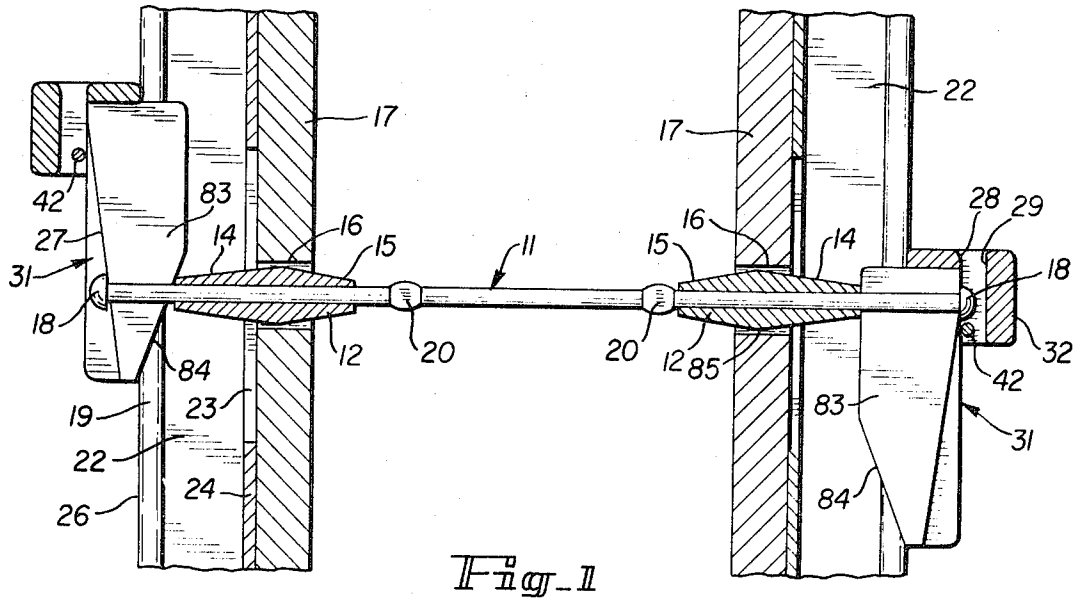


Fig_1

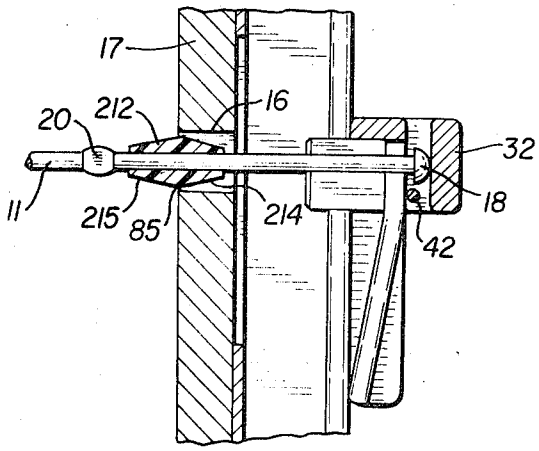


Fig_2

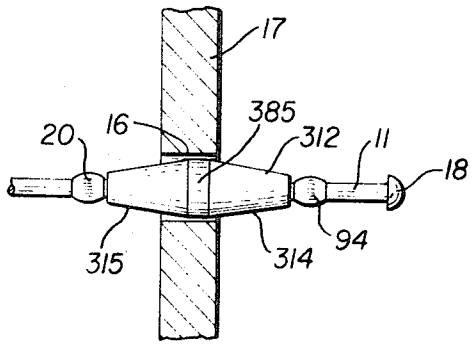


Fig_3

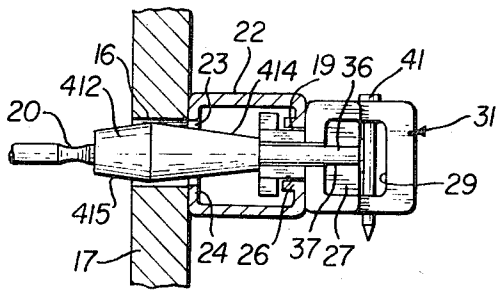


Fig_4

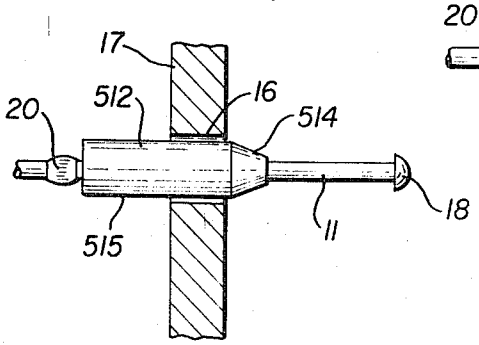


Fig_5

INVENTORS
JAMES W. FRANKLIN
DAVID R. WELLS
ELMER H. SCHELL
BY
ATTORNEY

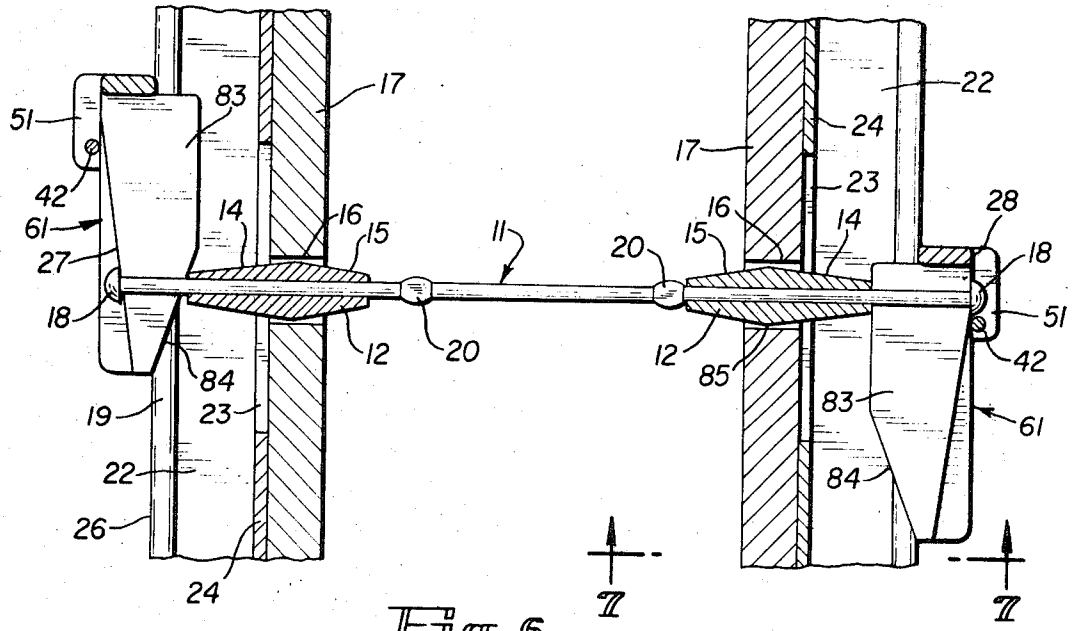


Fig_6

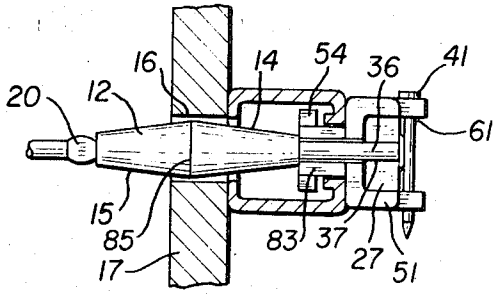


Fig_7

INVENTORS
JAMES W. FRANKLIN
DAVID R. WELLS
ELMER H. SCHELL
BY C. B. Messenger
ATTORNEY

CONE ELEMENT FOR CONCRETE FORMS

The present application is a continuation-in-part of a previous application filed June 11, 1966, bearing filing Ser. No. 563,011,now U.S. Pat. No. 3,482,813 which previous application was itself a continuation-in-part of an application filed Dec. 3, 1965, by the same inventors and bearing filing Ser. No. 511,480.

BACKGROUND OF THE INVENTION

The present invention provides improvements in the field of concrete forming and, more particularly, for the presently expanding field of gang forming operations. In such gang forming operations large form panels are utilized that are moved into operative position in a preassembled relation so that walls and surfaces of extended length may be formed speedily and poured unitarily. After use the panels in their still assembled relationship are removed to other points for reuse.

In connection with such gang-forming operations it is highly advantageous to provide a system that can be erected from work stations outside either of the opposed form walls. A form tie and wedge lock combination for facilitating such operations is disclosed in the mentioned application Ser. No. 563,011. The present invention is directed to the types of cone elements initially disclosed in said application and in modifications thereof that have been found to be advantageous.

The invention is also directed to a further cone element, form tie and wedge lock combination that may be used in place of the comparable combination first shown and described in the last mentioned application.

SUMMARY OF THE INVENTION

The present invention provides cone elements of separate design which are all of a size corresponding to the size of form tie openings provided in concrete form work so that the cone may be passed directly through such tie openings. The exterior size and shape of the cone is designed to closely engage the walls of the tie openings so that poured concrete will be prevented from escaping therefrom. All configurations for the cone elements are provided with a forwardly disposed surface of tapered contour so that the forward end is of smaller size than a rearwardly disposed main body of the cone elements. The forwardly tapered surface provides a self-finding feature that will facilitate the introduction of the cones into the tie openings and will, accordingly, facilitate the introduction of the form tie elements notwithstanding the fact that the ties are being emplaced from a work station outside the form structure. The cone is disposed on a form tie and may be held in regulated position thereon by crimped sections of the tie and/or by elements of a form lock. When disposed in a proper position, the escape of poured concrete will be avoided or minimized. The cone elements may be formed of a resilient material and may also be of a size to closely engage the tie members to maintain the cones in desired position.

For one embodiment of the invention a combination form tie, cone and form lock combination is used to not only facilitate erection of the forms but further to maintain the forms in properly spaced relationships before, during and after the concrete is poured. The form spacing functions are obtained by cooperative action of the cone element and guiding surfaces on a form lock. Outward movement of the forms is controlled by a shoulder element on the tie, while inward movement thereof is limited by the cone and crimped sections or shoulders formed on the tie at a position disposed inwardly of the form panels.

Some of the objectives of the present invention are as follows:

To provide a forming system utilizing ties in which the ties may be conveniently inserted through the form system from a position outside either of the exterior form walls.

To provide a form wall system that is useful in connection with gang forming operations.

In a concrete-forming system, to provide cone elements for facilitating the emplacement of form ties from work stations outside the form structure, and further to provide a concrete-forming system in which the spacing and alignment of the forms in their prepoured or in the poured condition is gauged from and controlled by the positioning of shouldered sections on the ties.

To provide a system as set forth above in which a cone element and form lock operate cooperatively to maintain said desired wall spacing even though there is no direct movement limiting engagement between the cone flanges and the form walls.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top view in partial section showing form locks in disengaged and engaged positions and illustrating a first cone element configuration,

FIG. 2 is a top view in partial section showing a modified type of cone element,

FIG. 3 is a side elevation in partial section showing a further cone element configuration,

FIG. 4 is a side elevation in partial section showing an alternate cone configuration,

FIG. 5 is a side elevation in partial section showing a further embodiment of the cone configuration,

FIG. 6 is a top view in partial section similar to that of FIG. 1 illustrating a new form tie, cone and form lock combination, and

FIG. 7 is an end elevation taken from the position of line 7—7 of FIG. 6.

The described Figures are in part duplicates or adaptations of some of the illustrations previously presented in application Ser. No. 563,011 as follows:

FIG. 1 presents the details of previous FIGS. 7 and 8 with the FIG. 7 illustration being presented in reversed form.

FIG. 2 of the present application is based on FIG. 2 of the previous application.

FIG. 4 is related to the previous FIG. 9 illustration.

FIG. 6 of the present application presents a modification of the previous FIGS. 7 and 8 embodiment of the prior application, and FIG. 7 is similar to the previous FIG. 9 illustration.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A special feature of the invention is the provision of a combination of elements mutually adapted one to the other so that the form ties may be inserted through the form accessories and through paired form walls from a position outside either of the form walls. Through use of this feature both form walls may be positioned in approximate aligned relationships and thereafter the rod ties may be introduced through the paired walls from a working station outside the form walls. Notwithstanding such improved ease of erection, the form system still holds the form walls in desired aligned relationship both before the wall is poured and thereafter. Modified embodiments of the invention provide means for accurately positioning a cone-shaped flange element that is used so the tie ends may be broken away from the wall after the forms are stripped.

The present invention is primarily concerned with the provision of a cone element or cone flange that may be used in conjunction with forming systems where simplicity of erection and handling is paramount. As set forth in the previous application, it is desirable to provide a form system that uses form panels of large size or gang forms that may be moved unitarily to positions of use and reuse. When gang forms are used, it is inconvenient to work from a station inside opposed forms to place the form ties. The previous application and invention provided a system so that the form ties could be placed from a work station outside either of the opposed form walls. A system incorporating such facility of useage is illustrated and described in the previous application and features of a similar system are shown herein.

In FIG. 1 the pass-through feature has made it possible to erect each of the opposed form walls 17 in a near assembled

relation before any rod ties are applied thereto. When the boards or form walls **17** are in their desired position, a rod tie **11** is inserted through the slots **19** of the walers **22** and through the base openings **23** in the back web **24** of the walers **22** to pass through the paired openings **16** in the opposed boards **17**. The shoulders or button ends **18** of the tie rods **11** will then be disposed outwardly from the face web **26** of the waler **22** a distance sufficient to accommodate introduction of the wedge surface **27** of a wedge form lock **31** beneath the button head **18**. As opposed locks **31** are applied and moved into engagement with the button heads **18** of a single rod tie **11**, the opposed walers **22** and associated form boards **17** will be moved into their desired spaced relationship as the button ends progress along the wedge surface **27** to be received between the opposed parallel surfaces **28** and **29** of head enclosure **32** on wedge form locks **31**.

As shown in FIG. **4**, the wedge surface **27** is itself divided by a longitudinal slot **37** so that the shank portion **36** of the tie rod **11** will pass through the slot **37**, but the button head **18** cannot pass therethrough. As the wedge lock **31** is engaged, the button head will move along the wedge surface **27** until it is positioned within the head enclosure **32** and between the opposed surfaces **28** and **29**. When in this locked position, a nail **41** may be inserted through the openings **42** to retain the button head **18** of the rod tie **11**. With this combination of tie and wedge lock the prepoured positioning of the form walls is dependent upon the button head rather than upon the use of a positioning flange, which is in other form systems normally disposed interiorly of the form walls to prevent the inward collapse of the walls before the concrete has been poured. Such previously used flanges in some instances also serve to occlude the openings in the form boards so that concrete will not escape out of the poured wall through the tie openings. In accordance with the present invention, cone-flange elements **12** are provided to serve the opening occluding function. The cone elements shown in FIGS. **1–5** serve an additional purpose, however, since they facilitate breakback functions for the ties. If the ties are to be broken off at a point within the poured concrete wall, the ties are provided with a notch, struck indent or crimped section **20**. After the wall has been poured the ties may be twisted or bent to cause severance at such crimped section. When the tie end is removed, a hole is left in the formed concrete wall, and it is often desirable that the wall surface be smoothed over so that the tie location is closed off. Use of the cone-flanges or cone elements **12** will leave a shaped indent in the wall when the tie end and cone **12** is removed therefrom. Breakback operations are improved through use of any of the cone-flanges illustrated in the Figures of the present application.

In keeping with the invention the cone-flanges may be made of rigid or resilient material as indicated by the separate illustrations of FIGS. **1** and **2**. Rigid cones may be made of metal, wood or hard plastics. Further benefits may sometimes be realized from use of soft or resilient materials, as illustrated in FIG. **2**. Rubber or resilient plastics, such as vinyl, can be used. Where such resilient materials are used, the breakback operations are improved due to the fact that a wider range of movement for the tie rod end is possible when the cone-flange is distorted. A further advantage inheres from the use of resilient materials, such as the mentioned vinyl, if the interior bore **213** of the cone-flange is of a size to closely engage the shank of the form tie **11**. Close engagement will hold the cone-flange **212** in desired position so that it properly occludes the form board opening **16** without necessitating the use of a cone positioning surface, such as the surface extension **83** and its tapered edge **84**, as shown in FIG. **1**.

For either of the cone element configurations a large diameter section **85** will be in position to occlude the hole **16** while rearwardly directed portions of the cones extend toward the breakback indent **20** of the ties **11**. The surface extensions **83** and the tapered edges **84** of wedge locks **31** shown in FIG. **1** engage the outwardly disposed ends of the cone-flanges **12** and tend to move such cones to the operative or engaged position as shown at the right in FIG. **1**. When the lock is engaged as there illustrated, cone-flange **20** will be disposed between the crimped breakback section **20** and the extensions **83** of form lock **31**. The enlarged section **85** of the cone will then block off any escape of poured concrete through the opening **16**.

Additional configurations are shown for the cone-flanges illustrated in FIGS. **3**, **4** and **5**. In FIG. **3** a cone-flange **312** is disposed between crimped sections **20** and **94** of a tie **11**. A central enlarged section of exterior cylindrical shape **385** is provided to occlude the form board opening **16**. In FIG. **4** a cone-flange **412** is provided which has forward and rearward conical segments **414** and **415** that are of different taper. In FIG. **5** the cone-flange **512** has a rearwardly disposed cylindrical body **515** and a forward cone section **514**.

Cone-flange **312** of FIG. **3** is to be maintained in its operative position by crimped sections **20** and **94** on the tie **11**. The crimped sections are utilized to hold the cone element in its operative position, and no positioning extension **83** or similar element would be required.

All of the cones illustrated are provided with a forwardly tapered shape, such as the entrance or forward segment **14** of cone-flange **12** shown in FIG. **1**. All of these entrance cone segments taper rearwardly from a forwardly disposed size substantially corresponding to the size of the tie **11** to a larger intermediate configuration which corresponds to the size and shape of the openings **16** in the concrete form boards **17**. Rearwardly from the concrete occluding point, the opening size is either maintained as shown in FIG. **5**, or it is continued a short intermediate distance as shown in FIG. **3**, or the cone-flanges are again tapered rearwardly. The rearwardly tapered shape may be substantially the same as the entrance section as shown in FIGS. **1**, **2** and **3**, or it may have a truncated taper as shown in FIG. **4**. Whether tapered or not the rearward section provides means for preserving an opening about the tie end that will facilitate the breaking of the ties after the wall has been poured and that will further provide a hole of regular dimension that may be filled and patched after the tie ends have been removed.

FIGS. **6** and **7** present a new form tie, wedge lock and cone combination, the use of which is similar to that described in the prior application Ser. No 563,011. Actually most of the structural features of this embodiment of the invention are identical with the elements illustrated in FIG. **1** of the present application or in FIGS. **7** and **8** of the mentioned previous application. Accordingly, the same numbering for the parts and components is maintained except that the form locks are changed and are now designated by the number **61**. This change in numbering is occasioned by reason of the fact that the head enclosure **32** is omitted. Form lock sidewalls **51** are still provided so that the nail opening **42** is preserved, but the crosshead which provided the surface **29** is eliminated. This surface can be eliminated and the forming system will still operate to maintain the form walls **17** in adjusted position before the wall is poured, since cone-flanges **12** are disposed between the crimped sections **20** and the foot elements **54** on the extensions **83**. With this arrangement inward movement of the form walls is resisted by engagement of the cone **12** against the crimped section **20**, while the outward movement is still resisted by the shoulder or button head **18**. For this embodiment of the invention the cone-flanges **12**, accordingly, serve a further and additional beneficial purpose by holding the form walls in desired position notwithstanding the fact that there is no direct movement limiting engagement between the cone-flanges **12** and the form boards **17**. The cone elements **12** used in this combination are preferably of a harder type of plastic material so that these cones are free to move along the shank of the form ties being used. The forwardly extending conical shape will still serve its hole finding function when the ties are being placed, however, since the tie inserting movement will itself tend to bring the cone rearwardly against the crimped section **20**.

The use of harder or less resilient compounds in the construction of all of the cone configurations illustrated provides an additional benefit. With close engagement between the cones and the form boards, tie ends have a lesser freedom to flex when the form locks are struck to apply or release the form locks. A further advantage of the form lock **61** shown in FIGS. **6** and **7** is related to this same problem. In form lock **61** the head **18** is exposed, and, accordingly, restraint can be applied directly thereagainst when the form lock is being applied or removed to eliminate flexure of the tie. When the rod or tie is restrained, a single hammer blow will release a form lock so the gang forms can be easily stripped for unitary movement to a next work station.

We claim:

1. A form tie and cone-flange element combination for use in concrete-forming operations to hold concrete supporting form elements in desired position and for preventing escape of poured concrete through form tie openings in said form elements comprising a form tie having an elongated shank for disposition between said form elements and through said form tie openings, engaging elements on said form tie of size larger than the shank of said tie and smaller than the tie openings in said form elements, a cone-flange extending longitudinally along said form tie having an elongated body providing a longitudinal bore therethrough for engagement about said form tie, said cone-flange having a first element that tapers from a small size to a larger diameter that substantially fills said form tie opening and a second element that tapers from said larger diameter to a smaller size whereby said tapered elements facilitate self-finding insertion of said cone-flange and form tie through said form tie openings when introduced through paired form openings from a work station outside either form element to position the engaging elements of said form tie in operative position outwardly of said form elements.

2. Structure as set forth in claim **1** wherein a tapered end of said cone-flange is of conical shape.

3. Structure as set forth in claim **2** wherein said conical shape tapers from a small end of size corresponding to the external size of said form tie to the larger size corresponding to the size of the form tie opening.

4. Structure as set forth in claim **3** wherein the defined conical shape and taper is disposed on said insertion tip end.

5. Structure as set forth in claim **1** wherein said cone-flange is formed of a resilient material and the longitudinal bore through said cone-flange body is of a size to closely engage the form ties whereby movement of said cone-flange along the tie is resisted by such close engagement and the resilience of said body.

* * * * *