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Paterson et al.

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(54) **METHOD OF SECURING WALLS WITH A TIE**

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(73) Assignee: **Helifix Limited**, London (GB)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Sep. 8, 1998**

Related U.S. Application Data

(63) Continuation of application No. 09/105,922, filed on Jun. 27, 1998, now Pat. No. 6,039,125, which is a continuation of application No. 08/870,708, filed on Jun. 6, 1997, now Pat. No. 5,772,375, which is a division of application No. 08/721,827, filed on Sep. 27, 1996, now Pat. No. 5,687,801, which is a continuation-in-part of application No. 08/491,358, filed on Jun. 30, 1995, now Pat. No. 5,586,605, which is a continuation-in-part of application No. 08/204,465, filed on Feb. 28, 1994, now abandoned.

(51) **Int. Cl.⁷** **B25C 5/13**

(52) **U.S. Cl.** **173/1; 173/114; 173/202; 173/4; 29/456; 29/525.08**

(58) **Field of Search** 173/1, 4, 114, 173/202; 227/147; 279/145; 29/456, 525.08, 525.11

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Helifix® Stainless Steel Retrofit Wall Tie System—A four (4) page brochure publication printed and distributed on Jan. 1993.

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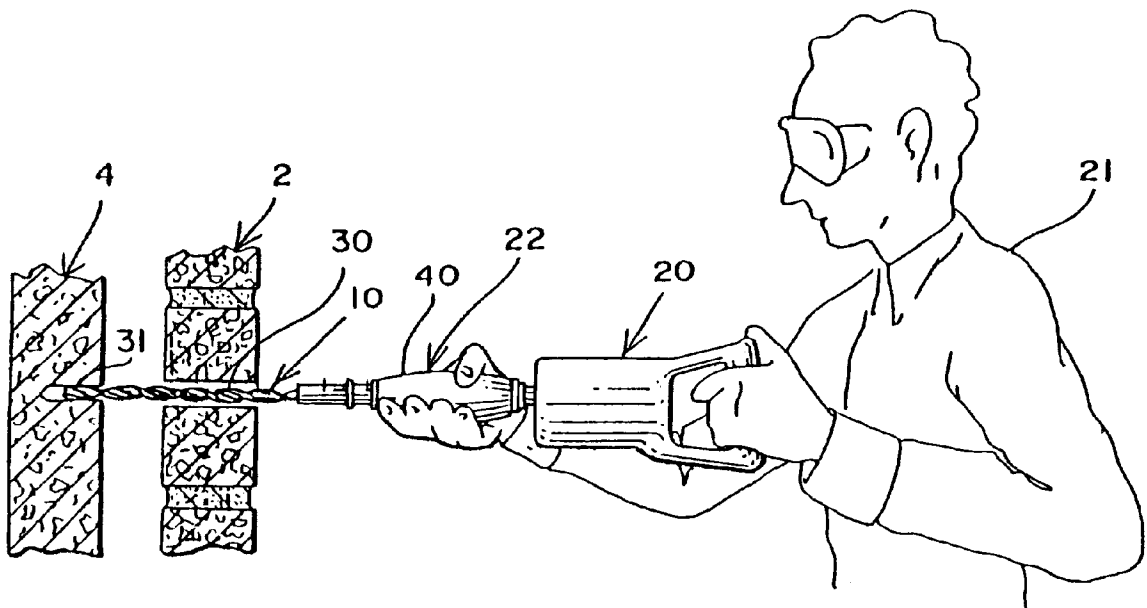
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(57) **ABSTRACT**

A helical wedge tie, anywhere from 2½ inches to 4 inches in length, (which is approximately the width of a standard brick), can be utilized to wedgingly engage the mortar in a wall after a helical main tie has been passed all the way through the mortar and secured in the concrete. The wedge tie may have the same helical pitch as that of the main tie, or it may be a pitch somewhat tighter or shorter to not only fill the space between the host tie and the mortar, but wedgingly engage the same. The auxiliary wedge pin may be pointed at both ends, pointed at one end, or even blunt at both ends. Successful fixes have been made where one end is sheared, and has a relatively chisel-like end. The method of the invention is directed to the reinforcing of a tie in a wall reinforcing environment, where the outer portion of the tie passes through a softer material, and a subsequent reinforcement of the tie portion in the soft material becomes desirable.

21 Claims, 5 Drawing Sheets



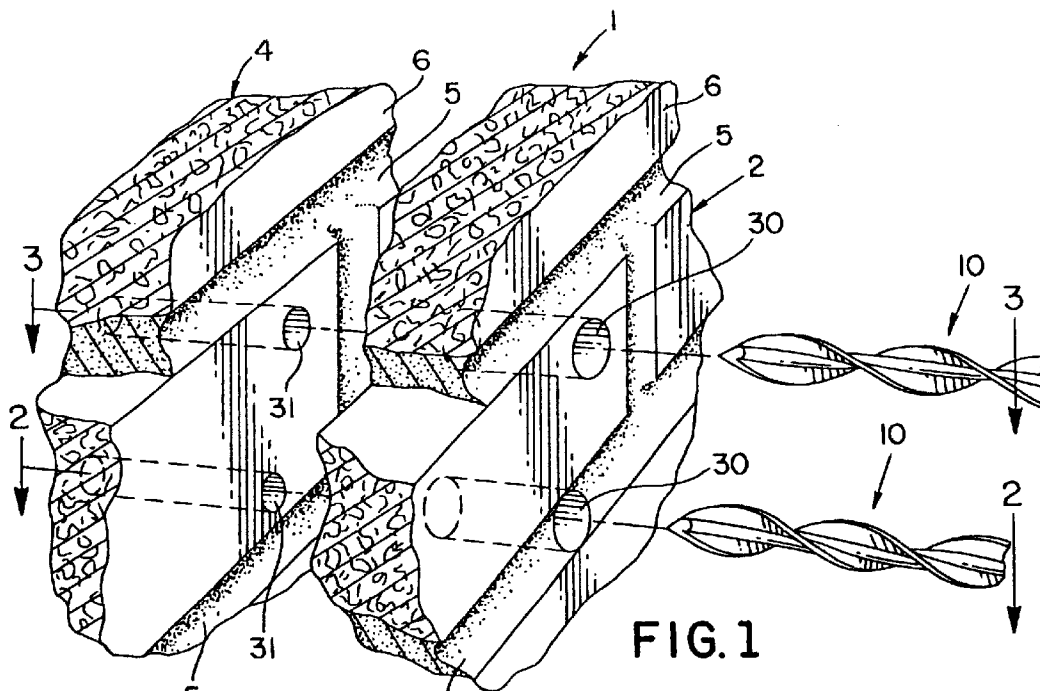


FIG. 1

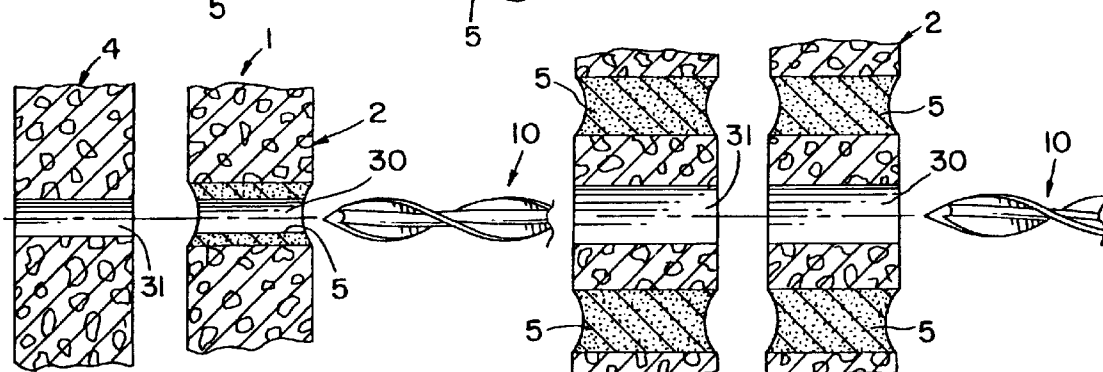


FIG. 2

FIG. 3

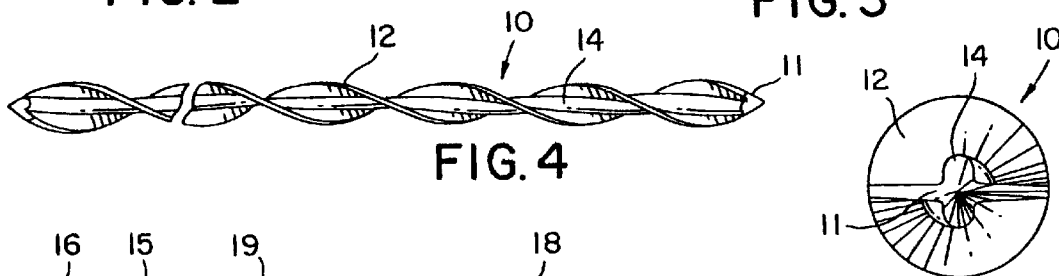


FIG. 4

FIG. 5

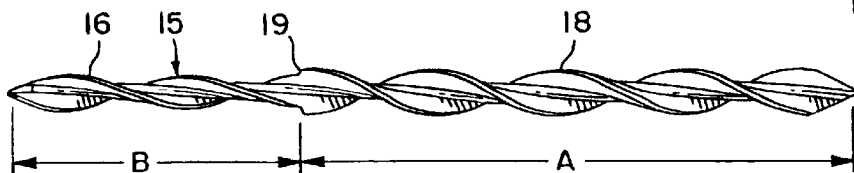


FIG. 6

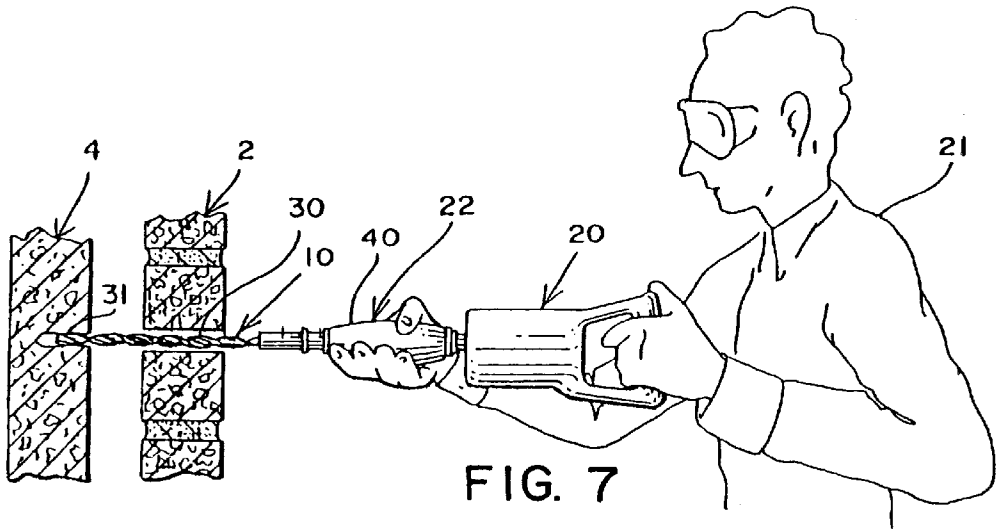


FIG. 7

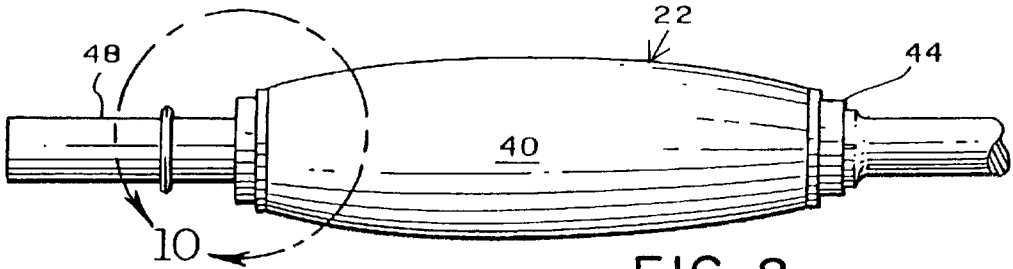


FIG. 8

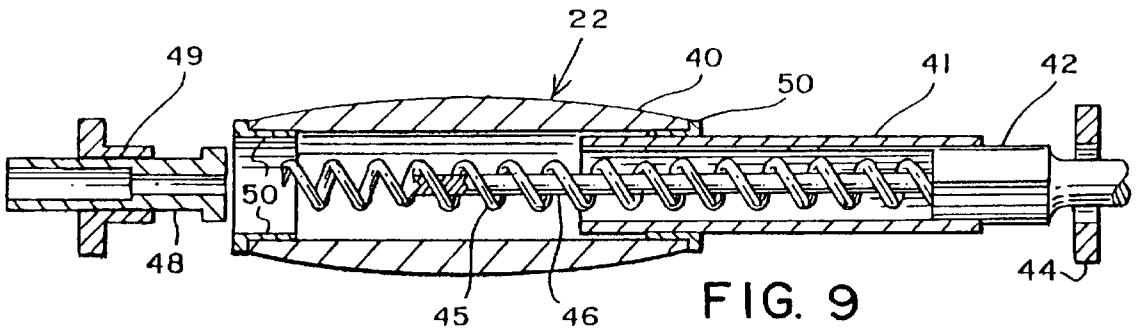


FIG. 9

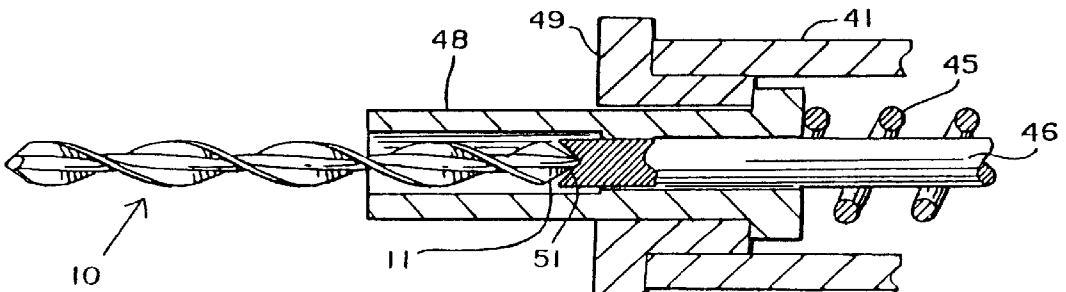
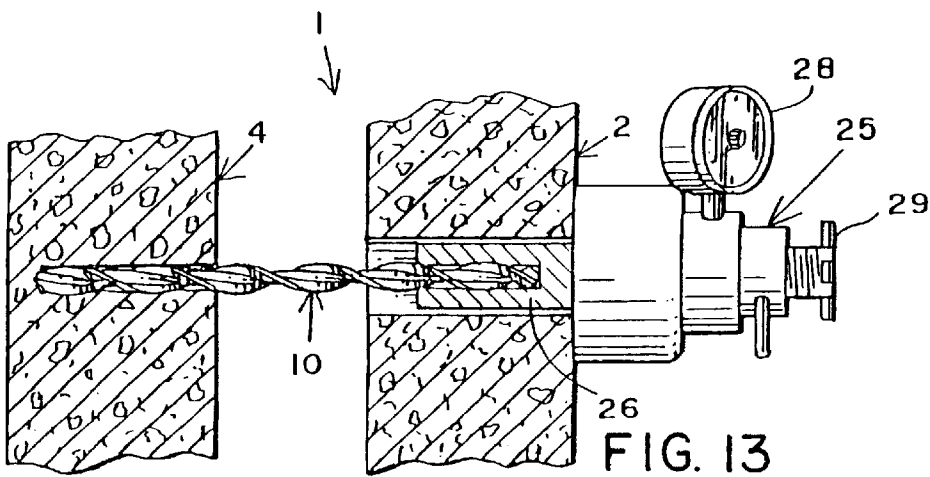
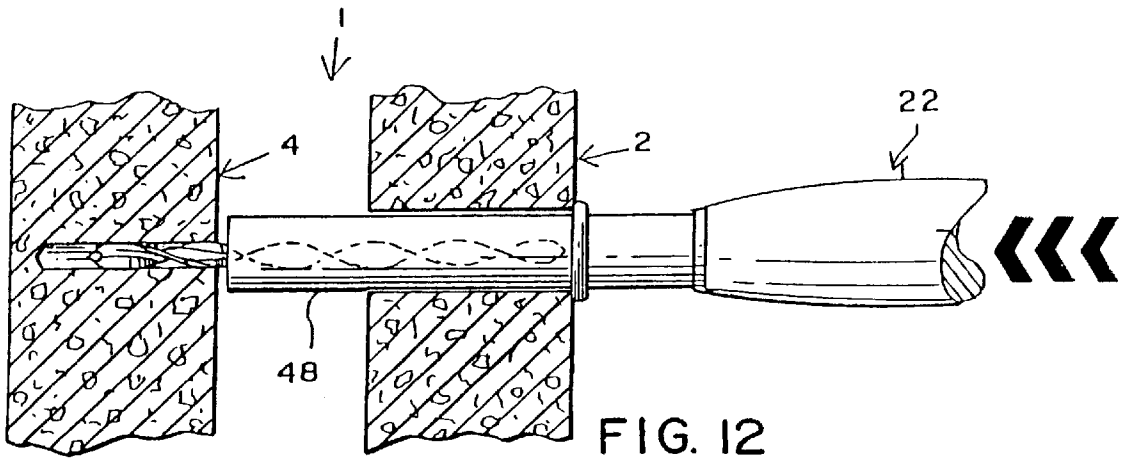
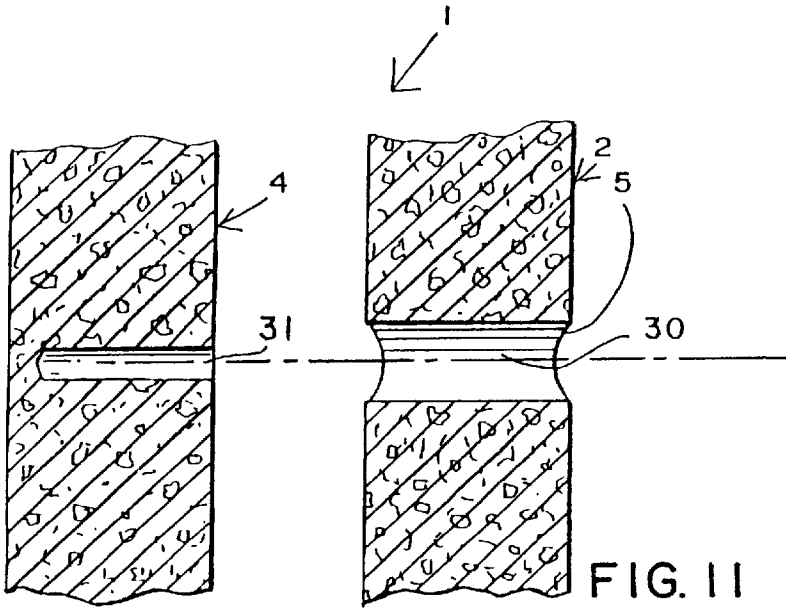


FIG. 10



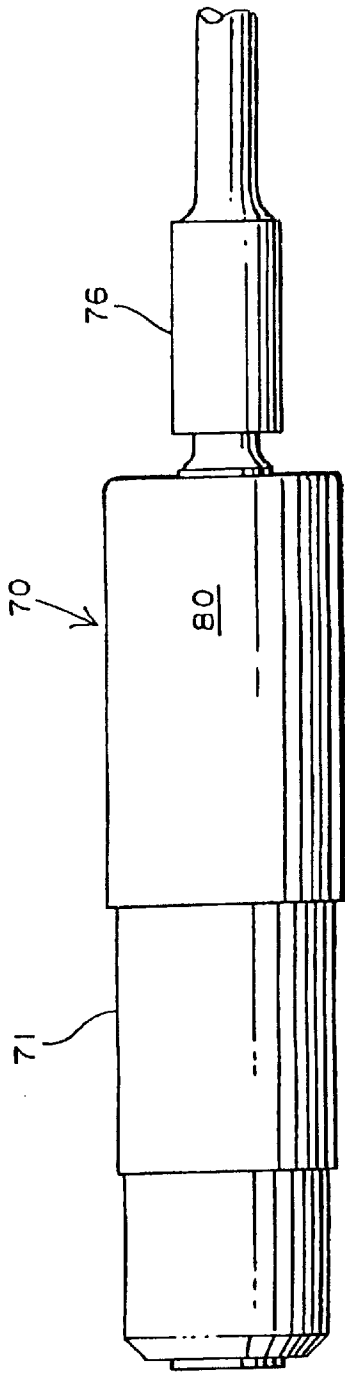


FIG. 14

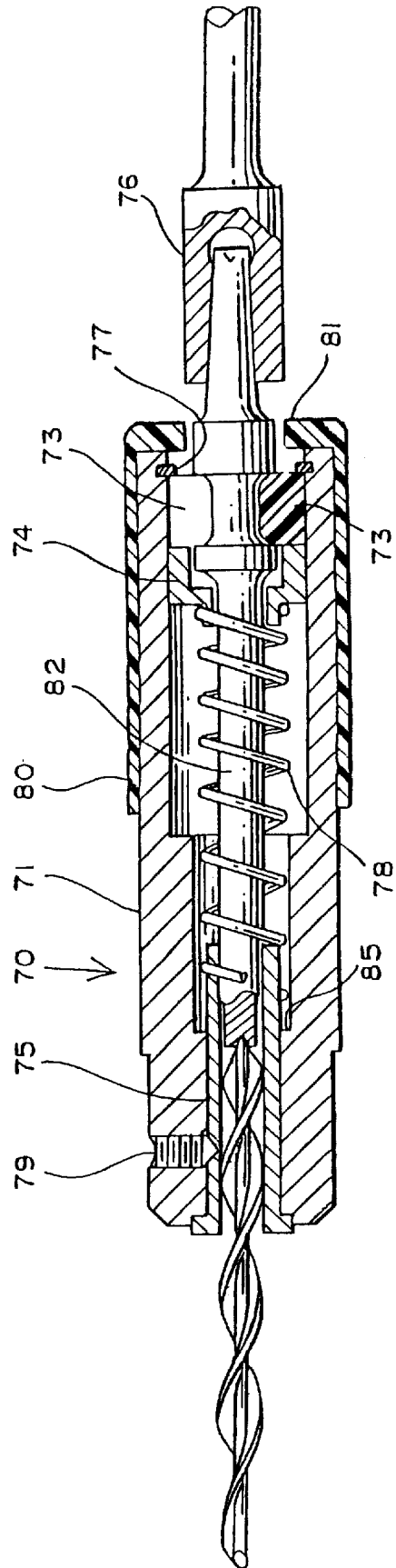


FIG. 15

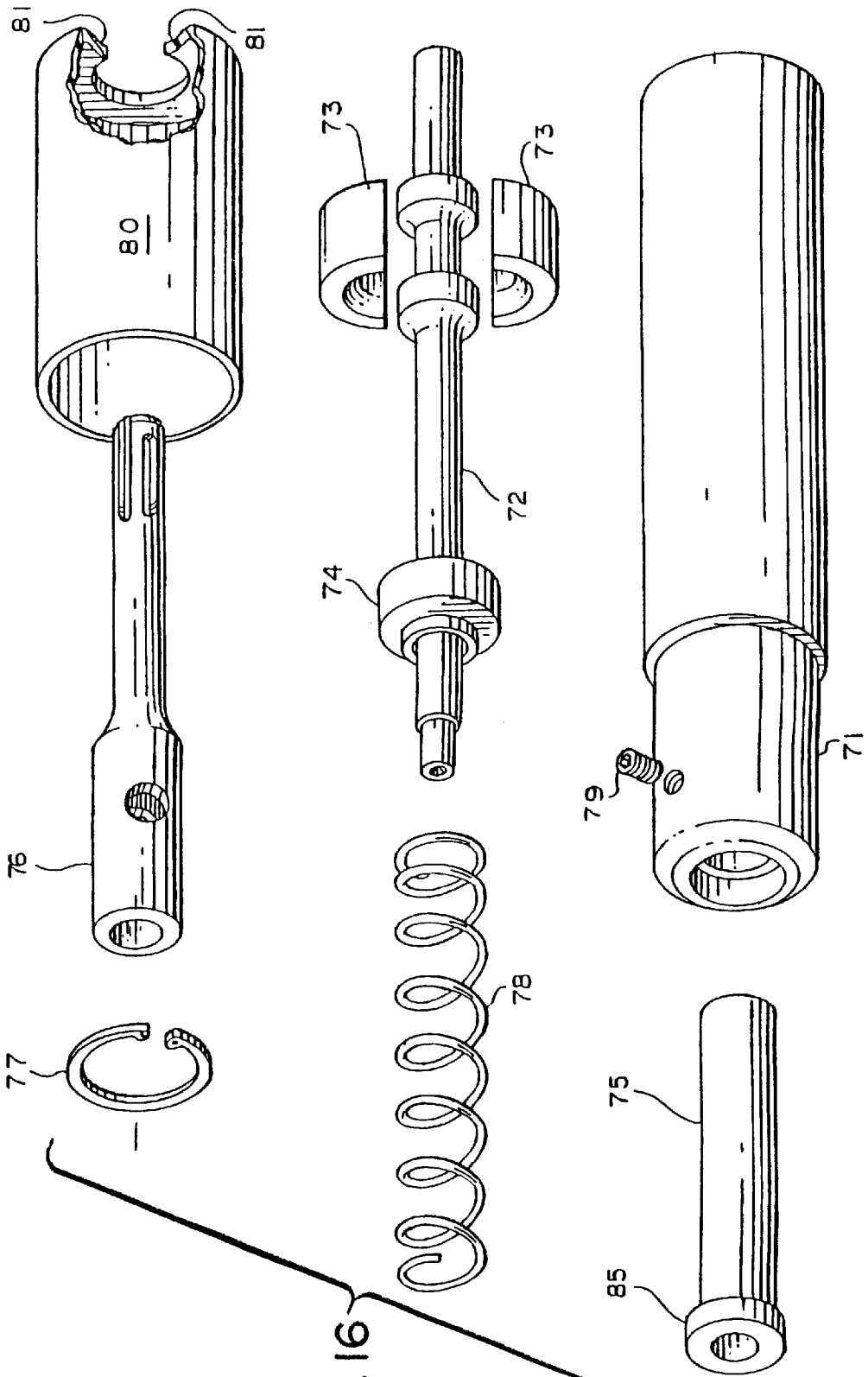


FIG. 16

METHOD OF SECURING WALLS WITH A TIE

CROSS-REFERENCE TO RELATED APPLICATION

This Application is a Continuation of application Ser. No. 09/105,922, filed Jun. 27, 1998, now U.S. Pat. No. 6,039,125, which is a Continuation of Ser. No. 08/870,708, filed Jun. 6, 1997, now U.S. Pat. No. 5,772,375, issued Jun. 30, 1998 which is in turn a Divisional of Ser. No. 08/721,827, filed Sep. 27, 1996, now U.S. Pat. No. 5,687,801 which is in turn a Continuation-In-Part of Ser. No. 08/491,358, filed Jun. 30, 1995, now U.S. Pat. No. 5,586,605 which is in turn a Continuation-In-Part of Ser. No. 08/204,465, filed Feb. 28, 1994, now abandoned. Of the foregoing, U.S. Pat. No. 5,586,605 relating to an adapter was issued Dec. 24, 1996, and U.S. Pat. No. 5,687,801 relating to a method, was issued Nov. 18, 1997.

FIELD OF THE INVENTION

The present invention is directed to the subject matter of reinforcing multiple walls usually in a building structure in which a tie is employed to secure two adjacent walls which are parting or otherwise need a tying arrangement.

BACKGROUND OF INVENTION

Oftentimes structures with multiple wythes brick, stone, concrete block, or even timbers are separated partly due to wind loads. The wind loads can be applied in suction or compression. Finally, extra structure loading may be applied in the form of earthquakes, earth shifts, mud slides, and others.

Various techniques have been developed, primarily in the United Kingdom, for a method of inserting and chemically bonding stainless steel helical ties into wood and masonry to enable the repair stabilization of multiple wythe walls normally having cavities between the wythes. Cavities between the adjacent wythes can be very small. Sometimes even zero in a solid wall, which nonetheless requires reinforcing.

In a proper cavity wall, the cavity will usually be one inch or more. Sometimes in the United Kingdom such cavities will be as wide as five inches, but normally in the two to four inch range. In the United States the gap is commonly approximately one inch. One such technique is marketed under the trademark RetroTie. Normally the tie is inserted from the outside wall, and the tie is driven into the inner wall where the tie itself cuts a thread in the substrate due to its rotation while being hammered into the wall. With harder materials such as brick and concrete, a pilot hole is normally drilled from the outside prior to insertion. The drills used for the pilot holes are normally 4.5 mm diameter drills irrespective of whether the tie is 6 or 8 mm in diameter. With certain softer materials such as soft wood, lightweight concrete, and such more unusual materials such as clay, no pilot hole is needed for that thickness.

The tie may be loaded into the insertion tool and a certain length left projecting for concluding the insertion. This length is determined by the needs of the job. Generally softer material requires deeper penetration. When the tie is inserted the amount of tie protruding is driven fully into the inner wythe, that is, the end of the support tool touches the inner wythe. After driving the tie to the required depth in the inner wythe, the outer end is lying in a clearance hole, which is ten millimeter for a six millimeter tie, or twelve millimeter for an eight millimeter tie. A plastic sleeve is pushed over the tie

and positioned adjacent to the cavity and thereafter bonding takes place by inserting in the outer wythe a bonding agent such as a polyester or epoxy resin. Exemplary of the foregoing are European Patents 0150906 and 0171250BT.

5 An alternative for this technique employs reinforcement bars or threaded bars which are chemically bonded into both the inner and the outer wythes. Also, ties are inserted which may use expansion anchoring techniques or anchoring techniques to fix both ends or with expansion at one end and a chemical at the other. Either one or both wythes have the chemical bonding applied.

10 The anchoring system as described is comparatively expensive, oftentimes too stiff to permit differential movement between the wythes which occurs during the natural expansion of inner and outer wythe due to temperature and moisture variations. On the other hand, ties sold pursuant to the trademark Helifix described hereinafter have both axial load carrying characteristics and offer lateral flexibility. Moreover, they have a built-in ability to shed water that might attempt to migrate from the outer wythe to the inner wythe.

SUMMARY OF THE PRIOR ART

25 The patent literature relating to the prior art is found primarily in Class 144, subclass 353, exemplary of which is Canadian Patent No. 457,923 and U.S. Pat. No. 3,144,892. Additional prior patents are German Patent No. 935,023, Netherlands Patent No. 8,903,120, W.O. 87/01,153, British Patent No. 2,237,319, British Patent No. 12,178,099, British Patent No. 2,250,311, British Patent No. 2,141,773, British Patent No. 2,223,556, and German Patent No. 3,716,808.

30 Of the above the Canadian patent is pertinent in that it shows joining two pieces of timber in a splice. The same is done by a dowel having threads which form an angle of 45° or more to a vertical plane passing through the dowel. The Canadian patent fails to teach anything with regard to securing brick to brick. Indeed, it should be noted that each of the five independent claims represent a "wooden structural unit" or "pre-fabricated wooden construction" to the exclusion of any other type of material. Thus, it is inapplicable to the use of a tie which is in essence a twisted flattened the use of a tie which is in essence a twisted flattened section with a central core and driven through two parallel wythes either brick to brick, mortar to brick, brick to wooden frame, and the like. The U.S. Pat. No. 3,144,892 to Webster just like the Canadian patent, each of the independent claims, here six in number, refer to a method of fabricating panels each panel being referenced as "wood panel components". Thus Webster, like the Canadian patent, fails to even address securing adjacent wythes of brick or other building components in an existing building to each other in reinforcing engagement.

SUMMARY OF THE INVENTION

55 The invention finds significant utility in a cavity wall which is usually made with a hollow concrete block as the inner wythe and brick as the outer wythe. The cavity is usually one-half to one inches and up to two inches between the two. The gap may vary from two inches to five inches or more. The system utilizes a spiral tie which is approximately 7-8 inches or longer. Sometimes the length can be as long as 11 inches, but may be longer or shorter depending upon the materials and the job site. With a 5 to 6 millimeter pilot hole drilled to the accuracy normally which can be achieved in a brick, the end of the tie will enter the pilot hole quite easily and cleanly. In the two step tie, the diameter is 6

millimeters and 8 millimeters, respectively, but may increase or decrease depending upon the application and materials. A special purpose insertion tool is fitted to a standard hammer tool. A center pin is provided in the insertion tool made with an indent to match the pointed end of the tie. The pin is then pressed into the SDS fitting which is the connection into the drill. The tie end is supported by a short sleeve which, when it contacts the face of the wall, retracts against a spring until the tie driving is completed. Usually the pin hammers out a short annular recess below the outer surface of the wall. A modified embodiment of the adapter recognizes that the drill which activates the hammer invariably rotates clockwise. Accordingly, if the spring is wound clockwise, the bottom tail end will dig into its seat. On the other hand, if it is wound counterclockwise, it rotates in a "tail skid" relationship to the seat. During the course of insertion, the pull-out resistance of the tie can be checked by using a pull unit. Normally the pull-out load requires determination one wythe at a time. This is achieved by drilling a clearance hole in the first wythe to measure the load achieved from the second wythe by inserting the tie into one wythe only.

In view of the foregoing, it is a principal object of the present invention to provide a method and apparatus for tying wythes together which is highly economical both from a cost standpoint of manufacture, and from the standpoint of the labor involved in achieving the fix, and also importantly by the elimination of the cost and hazards of a bonding chemical.

Yet another object of the present invention is to provide a multiple wythe apparatus tie and method in which the speed of insertion is high, namely one minute per tie, thereby providing a wall with sixty ties to be secured in approximately one hour.

An additional object of the present invention results from leaving a hole in the wall face which is small, thus minimizing the marking of the wall face, and permitting a small amount of material to be inserted over the tie to mask and seal and water proof.

An additional advantage of the subject apparatus and method is to provide excellent holding power along with significant lateral flexibility to accommodate expansion, contraction, wind loads, and even earth tremors.

Finally, but not conclusively, another advantage of the apparatus and method permits application on a year round basis with an instantaneous fix, and eliminating the need for a chemical bond which requires certain climatic conditions in order to cure for a full fix and has health and safety implications in its use.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the present invention will become apparent as the following description of an illustrative embodiment proceeds, taken in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates diagrammatically a double wythe wall in which one of the ties penetrates the mortar between bricks, and the other tie penetrates the brick body itself;

FIG. 2 is a transverse sectional view taken along section line 2—2 of FIG. 1 showing the relationship of the tie and the two adjacent walls;

FIG. 3 is taken along section line 3—3 of FIG. 1;

FIG. 4 is a front elevation of the exemplary tie utilized in the method;

FIG. 5 is an end view of the tie shown in FIG. 4 and in slightly enlarged scale;

FIG. 6 shows an alternative embodiment tie the pilot end of which is a diameter smaller than the main body portion;

FIG. 7 is an illustrative view of a workman and a hammer drill inserting a tie illustrative of the present invention into a wall having two wythes where the first penetration is mortar and the second penetration is into a solid such as brick or concrete block;

FIG. 8 is a partially diagrammatic view of the hammer drill attachment which produces a unique action in the hammering process enhancing the method of inserting the ties;

FIG. 9 is an exploded view of the adapter shown in FIG. 8;

FIG. 10 is an enlarged view of the area shown in phantom lines by circle 10 in FIG. 8 and illustrating the rotational and non-rotational motion of the critical parts while being hammered;

FIGS. 11, 12, AND 13 are sequential views of the testing technique which is selectively utilized to determine the holding power of the tie in the inner wythe in which FIG. 11 illustrates the boring of a large hole in the first wythe and a pilot hole in the second wythe; FIG. 12 illustrates the hammering action through a sleeve in which the fix is secured into the second wythe; and FIG. 13 shows the application of a tensionometer secured to the tie to determine the tension required to dislodge the tie from the inner wythe;

FIG. 14 is a view of the modified adapter approximately the same size and section as that shown in FIG. 9 of the original adapter;

FIG. 15 is a view similar to FIG. 10, but also illustrating the modified adapter; and

FIG. 16 is an exploded perspective view of the modified adapter.

DESCRIPTION OF PREFERRED EMBODIMENT

BACKGROUND

Prior to describing an example of the use of the present method and apparatus it should be remembered that in tying two wythes in a wall together, it can be done from the outside to the inside, and from the inside to the outside. This is particularly important with historic buildings during total rehabilitation when the interior is gutted, and new interior is installed with a new interior wall or wythe, and then it is desired to tie the same to the original outer wall or wythe. The tie materials used are preferably stainless steel, Austenitic grades 304 or 316. The ties also can be made of other materials, and including tubular rather than solid, although best results have occurred with solid stainless steel materials. The drilling machine 20 employed such as shown in FIG. 7, is electric, air driven, or hydraulically operated. They employ SDS, SDS+, and SDS Max chucks. All of these are Bosch patented designs. The drilling machine can employ a roto stop feature. Also chiseling machines may be employed without rotary motion so long as the tie is permitted to rotate. The diameter maintained is usually 8 millimeters. Other sizes are possible for the ties such as 4.5 and 6.0 millimeters. Ten to 12 millimeters are both possible for certain high load applications. Also in some instances the number of wythes can be more than two. The only limitation on the number of wythes that can be secured is the strength of the tie and the machine power. Moreover, the wall may be brick/brick, brick/block, block/brick, block/block, brick/wood, block/wood, brick/concrete, and even terracotta type materials.

The Method

With the foregoing background in mind, the method will be reviewed as it addresses a wall **1** such as shown in exemplified form in FIG. **1**. There it will be seen that the wall **1** includes an outer wythe **2**, an inner wythe **4**, and a plurality of structural members **6** joined by mortar **5**. A tie **10** is driven through the outer hole **30** and into the inner hole **31** as will be described in greater detail hereinafter. In all applications most desirably the tie proceeds brick to brick, or at least mortar to brick. Preferably the inner wythe tie engaging member is solid. Further, the outer and inner holes are desirably at least 1 millimeter less in diameter than the tie **10**.

Referencing now FIG. **2**, there it will be seen that the tie **10** is passing through outer hole **30** in the mortar **5** into inner hole **31** in the brick **4** where the inserted tie **10** can be subsequently used to assess the tension. In FIG. **3**, the outer hole **30** is employed with a same diameter inner hole **31** in the inner wythe **4** for total penetration by the tie **10**. Desirably the outer hole **30** and inner hole **31** are the same diameter whether brick to brick or mortar to brick.

FIG. **4** illustrates the typical tie **10** having a beveled or chiseled end **11**, and a plurality of helical wound flutes **12** which surround a core **15**. As stated earlier, Austenitic steel of grades **304** or **316** are desirably utilized in forming the ties **10**.

A two-step tie is shown in FIG. **6**. There it will be seen that the small end **16** of the two step tie **15** is at the left-hand side and the large end **18** at the right-hand side with a step **19** between the two. The various desirable dimensions will be discussed hereinafter.

FIG. **7** illustrates the utilization of a hammer drill **20** held by an operator **21** in which he holds the adapter **22** in his right hand and the hammer drill **20** in his left hand. It will also be appreciated that the drill can be held in the right hand which is often a normal usage. The tie **10** is being passed through the outer wythe **2** and mortar **5** into the inner wythe **4**.

After the wall is tied together, the tie **10** thus helically grasps the interior wythe **4** as well as the exterior wythe **2**, and a dry fix or tying relationship is developed. The outer portion of the tie **10** will be buried slightly underneath the outer wythe **2**, and the hole left is filled with an adhesive or sealing agent, sometimes mixed with dust from wythe **2** to disguise and seal the hole.

The Adapter

It is necessary to appreciate that the power source is a hammer drilling machine **20** fitted with an SDS chuck. The hammer action against the tie **10** causes the tie to rotate as the helical roll penetrates the masonry. It is important that the tie be free to rotate in the nose of the adapter to avoid creating any stress in the masonry other than that imparted by the hammering action of the tie. The tie, in turn, will always follow a "natural" path which is the usual path of least resistance. The stroke of the hammer action is around 10 millimeter.

For the present application use is made only of the hammer action. some drilling machines have a feature called "roto stop" which can be selected and cuts out the rotary drive to the chuck, leaving only the hammer action. Electric or pneumatic chisel machines normally have the hammer action only.

As most drilling machines commonly found on site do not have the roto stop feature, the present adapter **22** has to be such as to permit its use both with a machine with rotary hammer action as well as one with hammer only.

The spring **45** and spring loaded sleeve **48** have any rotational movement imparted by friction only. When the nose of the spring loaded sleeve **48** hits the wall, the stainless steel flutes **12** in the tie **10** are continually driven into the wall, the spring **45** is compressed until the end of the sleeve **48** is flush with the front end screw **49**. The drawing shows the tool set up so that the driving pin **46** will project beyond the end of the sleeve **48** and will drive the tie **10** under the surface of the outer wythe **2** face. The drive pin **46** may be set to finish or set the tie **10** set flush. The flush setting is usually only used when the tie **10** is being driven into wood. The outer handle **40** is fitted with a metal bearing **50** at each end. This is held by the operator **21** usually and all the action goes on freely inside it, both rotational and to-and-fro. The tie **10** is driven by the cupped end **51** of the drive pin **46**.

The Modified Adapter:

The modified adapter **70** is best illustrated in FIGS. **14-16**. Here it should be remembered that the drill which activates the hammer and the hammer SDS chuck will rotate clockwise. Thus, as the rotation driven by the tie **10** creeps in a clockwise direction, the coil spring **78** compresses and drives the spring loaded spring ends rotatably clockwise or right-handed. With the modified adapter **70**, it will be seen that it utilizes an outer body **71** which runs substantially the entire length of the modified adapter **70**. A drive pin **72** is positioned centrally of the body **71**. The drive pin **72** engages a split bearing **73** which is seated within the outer body **71**. A spring seating washer **74** is held against the split bearing **73** by the spring **78**. A front sleeve **75** is secured interiorly of the forward portion of the outer body **71**. A tapered SDS adapter **76** is seated upon the driven end of the drive pin **72**. The split bearing **73** is sandwiched in place against the spring seating washer **74** by means of the snap ring **77**. The activity is applied by means of the coil spring **78** which is left-hand or counterclockwise wound rather than right-hand or clockwise wound. This is done to cause the remote end of the spring **78** to engage the spring seating washer **74** in a "tail skid" relationship. This action is similarly involved with the opposite end of the spring **78**. The front sleeve **75** is secured in place interiorly of the outer body **71** by means of set screw **79**. The outer body **71** is covered at its portion closest to the SDS adapter **76** by a plastic cover sleeve **80** which is in close fitting engagement to the outer body **71**, and extends throughout about half of the length of the outer barrel **71**. A centrally disposed collar **81** is located at the remote end of the plastic cover sleeve **80**. To be noted specifically is that the spring **78** seats at the split bearing **73** end in the spring seating washer **74** and is secured therein by means of the collar **83**. At the opposite end, an annular space **84** terminating in a shoulder **85** is defined between the inner portion of the front sleeve **75** and the inner portion of the outer body **71**.

The 2 Diameter Tie

Normally a suitable pilot drill is driven through consecutive wythes and the helical tie **10** is driven home. Where the materials of the different wythes are similar or, at least, are of similar strength, this works fine.

Where the outer wythe **2** is harder/stronger than the inner wythe **4** materials then, on occasions, it may be necessary to drill a first hole right through which is correct for the softer/weaker materials and then use a slightly larger pilot in the harder material only.

The problem comes where the outer material is soft, requiring the smaller hole and the inner material is hard requiring a larger hole. The example which demands this new technique occurs where there is a requirement to fix

through the mortar joint in the outer wythe and fix into reinforced concrete or brick. With the two diameter tie **15** of FIG. 6 one can use a single drill through the mortar and into the concrete or brick. The small end **16** is then driven into the hard material and the large end **18** will still get a good grip in the softer, outer wythe mortar. The two step tie **15** proves useful, not just in the mortar bed to concrete application above, but in any application where one wants to fix soft/weak to hard/strong. The division between the small end **16** and large end **18** forms a step **19** in the two step tie **15**. The small end **16** is normally but not necessarily the shorter end, about one third the length of the two step tie **15**.

Load Test Unit

The load test unit or tensionometer **25** uses a small hydraulic cell which has pressure applied to it by a jacking screw or actuator **29**. The pressure is measured by the gauge **28** which is calibrated to give a direct reading of force applied when engaged to a tie **10** by the load test key **26**.

The load test key **26** fits over the end of the tie imparting no torsional load and only an end load. The cross piece of the key fits into the end of the central shaft and an axial load is applied by turning the jacking nut or actuator **29**.

With the illustrated system it is not possible to test the tie in its final fixed state. The strength of the inner wythe is determined by making a clearance hole in the outer and driving the tie into the inner wythe or by using a core drill to create a clearance hole around the end of the tie in the outer wythe after insertion. The load test unit **25** is applied and the strength is determined. This is repeated at several locations around the building and usually the weakest load obtained is used for the design of the fixing pattern.

Similarly the outer wythe **2** is tested by driving a tie **10** through the outer wythe **2** only—not into the inner **4**—and applying the load test unit **25** to measure the strength;

Although particular embodiments of the invention have been shown and described in full here, there is no intention to thereby limit the invention to the details of such embodiments. On the contrary, the intention is to cover all modifications, alternatives, embodiments, usages and equivalents as fall within the spirit and scope of the present invention, specification and appended claims.

What is claimed is:

1. A method of securing two or more wythes in a building structure utilizing a helical tie member having longitudinal helical flutes terminating at a cutting end at one end and terminating at a remote end opposite the cutting end comprising the steps of:

drilling a first wythe pilot hole to a diameter less than a diameter of the flutes on the tie to be inserted;

drilling a pilot hole in a second wythe to a predetermined depth;

inserting the remote end of the tie into a reciprocating power driven tool which has a rod which engages and impactingly drives the tie with a hammer like impact in the absence of any driven torque and permits the tie to rotate while confined around its longitudinal axis as a helical bed is developed in the first wythe due to the torque free impact penetration by the tie;

passing the flutes into the second wythe and continuing to impactingly drive the tie to a base of the pilot hole;

removing the driving tool from the remote end of the tie; and thereafter finishing the remote end of the tie in accordance with mandates of the site.

2. In the method according to claim **1**, the further step of: impactingly driving the tie with power driven SDS drilling machine and a spring biased adapter connected to

said SDS machine which retracts the rod between the blows of the SDS machine and the contact with the impacted end of the tie.

3. In the method according to claim **1**, the further step of: yieldably biasing the connection between the remote end of the tie which is impacted and the SDS drilling machine to permit the tie to rotate as the tie develops its helical bed.

4. In the method according to claim **1**, the further step of: engaging the tie through a spring biased floating drive element in the adapter so that the tie may freely rotate during the time of impacting unrestricted by the hammer like impact of the impacting member of the adapter.

5. In the method of claim **1**, the further step of: drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the flutes of the tie, and

drilling a pilot hole in the inner wythe having a diameter which is less than the tie.

6. In the method according to claim **1**, driving the tie into the outer wythe to bury the same in the outer wythe prior to finishing.

7. In the method of claim **6**, the further step of: drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the flutes of the tie, and

drilling a pilot hole in the inner wythe having a diameter which is less than the tie.

8. In the method according to claim **1**, drilling the outer wythe and the inner wythe to a diameter of at least 1 mm less than the diameter of the flutes of the tie.

9. In the method according to claim **1**, the further step of: impactingly driving the rod engaging the end of the tie opposite the cutting end with a tool having a spring biasing reciprocating member having two ends, one end engaging the tie in a repetitive hammer like impact and the other end of said reciprocating member engaging a power hammer for repeatedly delivering a blow to each reciprocating member in a torqueless engagement thereby permitting the tie to rotate in the absence of applying a torque as it cuts its helical bed and in which the reciprocating member is urged to retract after each blow by the spring.

10. In the method of claim **9**, the further step of: drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the tie, and drilling a pilot hole in the inner wythe having a diameter which is less than the diameter of the flutes of the tie.

11. A method of securing two or more wythes in a building structure, the first wythe of which has an outer and an inner face utilizing a helical tie member having longitudinal helical flutes terminating at a cutting end at one end and terminating at a remote end opposite the cutting end where the tie is impacted and in which a power driven tool for impactingly driving is selected from the types which have a hammer action of a power drilling machine with a chuck removably secured to an adapter, which adapter contains yieldable means between the hammer blow and the tie, said adapter and power drilling machine engaging the tie through a torqueless floating drive in the adapter so that the tie may freely rotate during the time of impacting unrestricted by the rotating, if any, of the impacting member of the adapter, comprising the steps of:

drilling a first wythe with a drill hole to a diameter less than a diameter of the flutes on the tie to be inserted which diameter shall be at least 1 mm less than the diameter of the tie;

thereafter drilling a pilot drill hole in the second wythe to a predetermined depth which will permit the tie when totally passed through both wythes to be inserted slightly beneath the face of the first wythe;

inserting the remote end of the tie into said adapter for the power driven tool which impactingly drives the tie with a hammer like repetitive engagement without applying any torque to the tie and permitting the tie to rotate confined around its longitudinal axis for alignment into the drill holes as a helical bed is developed in the first wythe due to the penetration by the tie;

positioning said adapter and its yieldable means between the impacting power driven tool and the portion of the tool which engages the tie to thereby bias the tie and cushion the impact of the power driven tool;

passing the flutes into the second wythe and continuing to impactingly drive the tie to a base of the second wythe pilot hole.

12. A method of securing two or more wythes, the first wythe of which has an outer and an inner face, in a building structure utilizing a helical tie member having longitudinal helical flutes terminating at a cutting end at one end and terminating at a remote end opposite the cutting end where the tie is impacted and in which a power driven tool for impactingly driving is selected from the types which have a hammer with a chuck removably secured to an adapter, which adapter contains a spring means between the hammer and the tie, said adapter and power drilling machine engaging the tie through a non rotating hammer like floating drive with a drive pin in the adapter so that the tie may freely rotate during the time of impacting unrestricted by the rotating, if any, of the drive pin impacting member of the adapter, comprising the steps of:

drilling a first wythe hole to a diameter less than a diameter of the flutes on the tie to be inserted which diameter shall be at least 1 mm less than the diameter of the tie;

thereafter drilling a pilot hole in the second wythe to a predetermined depth base which will permit the tie when totally passed through both wythes to be inserted slightly beneath the face of the first wythe;

positioning a sleeve in the adapter to surround the driving pin where the pin engages the tie;

inserting the remote end of the tie into said adapter for the power driven tool which impactingly drives the tie and permits the tie to rotate confined around its longitudinal axis as a helical bed is developed in the first wythe due to the penetration by the tie;

positioning said adapter with a yieldable means between the impacting power driven tool and the portion of the tool which engages the tie to thereby bias the tie and urge the tie hammer away from the tie after each hammer blow is struck on the tie; and

passing the flutes into the second wythe and continuing to impactingly drive the tie to the base of the second wythe pilot hole.

13. In the method according to claim **12**, the further step of:

impactingly driving the rod with an adapter that is spring biased to retract the blows of the SDS machine and the contact with the impacted end of the tie.

14. In the method according to claim **12**, the further step of:

driving the tie into the outer wythe to bury the same in the outer wythe prior to finishing.

15. In the method according to claim **12**, the further step of:

drilling the outer wythe and the inner wythe to a diameter of at least 1 mm less than the diameter of the flutes of the tie.

16. In the method according to claim **12**,

impactingly driving the tie by engaging the end of the tie opposite the cutting end with a tool having a spring biasing reciprocating member having two ends, one end engaging the tie in a repetitive hammer like impact and the other end of said reciprocating member engaging a power hammer for repeatedly delivering a blow to reciprocating members in a torqueless engagement thereby permitting the tie to rotate in the absence of applying a torque as it cuts its helical bed and in which the reciprocating member is urged to retract after each blow by the spring.

17. In the method according to claim **12**, the further step of:

yieldably biasing the connection between the remote end of the tie which is impacted and the drilling machine to permit the tie to rotate as the tie develops its helical bed.

18. In the method according to claim **12**, the further step of:

engaging the tie through a spring biased floating drive element in the adapter so that the tie may freely rotate during the time of impacting unrestricted by the hammer like impact of the impacting member of the adapter.

19. In the method of claim **12**, the further step of:

drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the flutes of the tie, and

drilling a pilot hole in the inner wythe having a diameter which is less than the tie.

20. In the method of claim **12**, the further step of:

drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the flutes of the tie, and

drilling a pilot hole in the inner wythe having a diameter which is less than the tie.

21. In the method of claim **12**, the further step of:

drilling the outer wythe with a pilot hole of at least 1 mm diameter less than the diameter of the tie, and

drilling a pilot hole in the inner wythe having a diameter which is less than the diameter of the flutes of the tie.