

Nov. 15, 1960

H. G. GATES

2,959,835

PLUG FOR LOOPED WIRE CONCRETE FORM TIES

Filed June 19, 1958

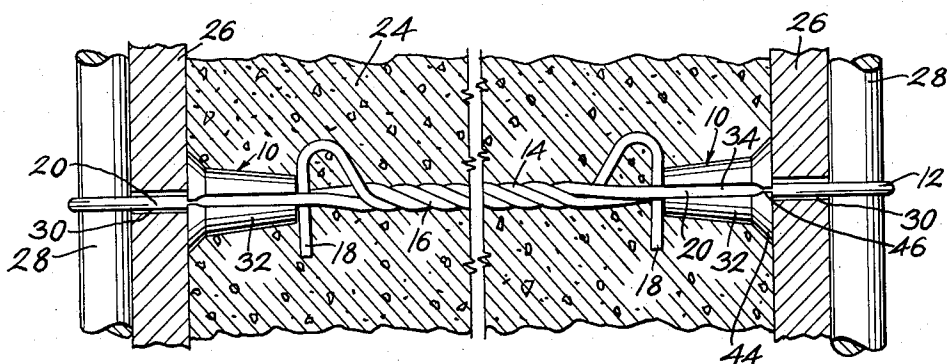


Fig. 1.

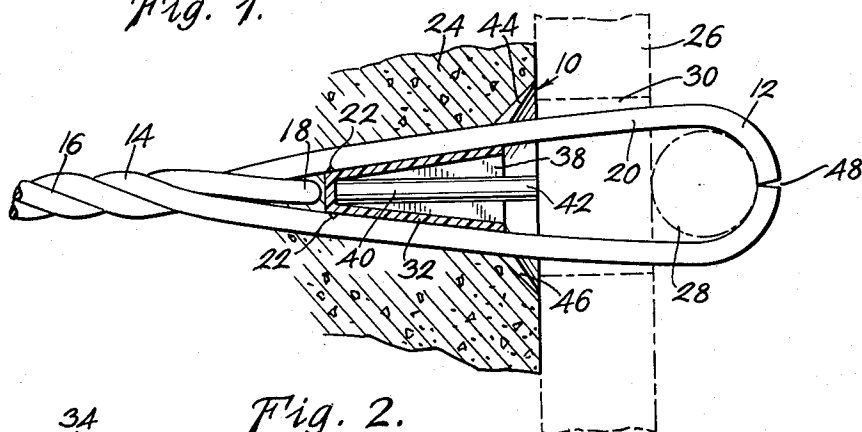


Fig. 2.

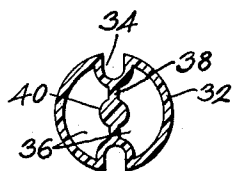


Fig. 3.

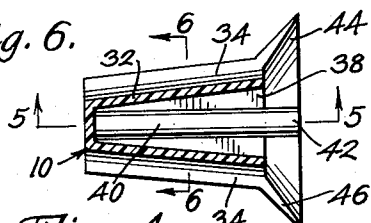


Fig. 4.

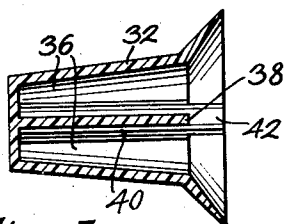


Fig. 5.

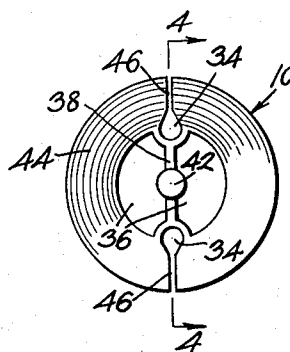


Fig. 6.

INVENTOR.
HARRIS GORDON GATES
BY
[Signature]
ATTORNEY

1

2,959,835

PLUG FOR LOOPED WIRE CONCRETE FORM TIES

Harris Gordon Gates, Englewood, Colo., assignor to Gates & Sons, Inc., Denver, Colo., a corporation of Colorado

Filed June 19, 1958, Ser. No. 743,080

9 Claims. (Cl. 25—131)

This invention relates to concrete plugs and, more particularly, to an improved plug especially adapted for use with loop-ended wire concrete form ties.

For many years, concrete form ties of one type or another have been used to secure and maintain form walls in fixed spaced relation so that wet concrete could be poured therebetween. In most applications, the ties are cut or otherwise severed at a point on the outside of the form walls so that the forms can be stripped from the set concrete. When this is done, the severed ends of the ties project from the finished face of the concrete and present an unsightly appearance. Quite often, these concrete walls are below ground or are covered with some type of finishing material which hides the tie wires.

Lately, however, it has become quite common to leave the concrete following removal of the forms as the finished wall. This, of course, necessitates the elimination or removal of the projecting form tie ends if the wall is to present a finished appearance.

Some of the early attempts to solve this problem took the form of a so-called "breakback tie" which included a notch or other weakened portion located inside the concrete wall. After the form walls have been removed in the ordinary manner, the projecting ends of the tie wires are twisted or otherwise moved until they break off and can be pulled from the concrete. Unfortunately, this did not solve the problem as the small holes left in the concrete following removal of the tie wire ends or rod ends therefrom were found to be extremely difficult to patch.

Therefore, a further refinement was added in the form of tapered plugs removably attached to the ends of the tie. These plugs, when removed from the finished concrete wall, left a rather sizable depression or pocket therein that could easily be filled with concrete and patched. Plugs of this type are customarily made of wood or other rigid material and the wire or rod from which the tie is constructed generally passes therethrough.

For some time, however, it has been known that the prior art form tie plugs possess certain disadvantages that limit their usefulness to a great extent. First of all, wooden plugs are quite expensive and ties equipped therewith are oftentimes too costly for many contractors or cannot be justified in ordinary forming applications. Secondly, assembly of the wooden plugs on the tie is an expensive, time-consuming operation that further increases the cost thereof.

Most of the prior art concrete plugs are not reusable or, at least, they cannot again be mounted on the tie without the aid of a complex machine especially designed for this purpose. Some plugs for this purpose are extremely difficult to grasp either with the hand or a suitable tool in order that they might be removed from the concrete wall.

Perhaps the most serious problem is, however, the fact that the prior art plug designs make no provision which will compensate for spreading of the form walls as a result of stretch in the ties. It is well known that

2

a certain amount of widening in the space between the form walls occurs especially at or near the base of the wall caused by the hydrostatic forces acting to stretch the ties. With the ordinary plugs, the form walls move away therefrom leaving a gap into which the wet concrete flows thus covering the plugs and sealing them in the wall. This, of course, creates quite a problem as the concrete must then be broken away to expose the plug and removal thereof becomes difficult because of its recessed position.

Finally, the concrete sticks of the prior art plugs unless they are coated with oil or otherwise lubricated immediately prior to use thereof. The oil enables the plug to be removed rather easily; however, the oil residue left in the hole formed by the plug following withdrawal thereof prevents the concrete patch used to fill the hole from bonding properly with the concrete of the wall.

It is, therefore, the principal object of the present invention to provide an improved concrete plug especially suited for use with loop-ended wire ties.

A second object is the provision of a concrete plug that is formed from plastic to which the concrete will not stick and which, therefore, does not require lubrication.

A third objective is the provision of a concrete plug designed to close onto the tie wire in such a manner that seepage of the concrete around the wire or through the tie slot in the form wall is virtually eliminated.

A fourth object is to provide a concrete plug which coacts in combination with certain types of looped wire ties to maintain sealed contact with the form walls even though the walls spread apart due to stretching of the ties.

A fifth objective is the provision of a plastic concrete plug which has a pocket or recess formed therein and intersected by a web that can be grasped with the hand or a pair of pliers to effect removal of the plug from the wall.

Another objective of the invention is to provide a concrete plug that can be attached to, and detached from, a looped wire tie with a simple hand operation that can be performed on the job.

Additional objects are to provide a concrete plug for looped-ended ties that is simple to manufacture, install and remove, one that is inexpensive, lightweight and easily removed from the wall, and one that is decorative in appearance.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawing that follows, and in which:

Figure 1 is a fragmentary sectional view showing the improved concrete plugs of the present invention mounted in place within the loops at opposite ends of a wire tie used with vertical rods to maintain two panel form walls in fixed spaced relation on opposite faces of a concrete wall or the like, portions of said wall and tie having been broken away to conserve space;

Figure 2 is an enlarged top plan view of a portion of the wall and one loop of the tie with the plug shown in sections therein, the rod and panel having been indicated in dotted lines;

Figure 3 is an end view of the plug to an enlarged scale;

Figure 4 is a section taken along line 4—4 of Figure 3;

Figure 5 is a section taken along line 5—5 of Figure 4; and,

Figure 6 is a section taken along line 6—6 of Figure 4.

Referring now to the drawing, and in particular to Figures 1 and 2 thereof, it will be seen that the concrete plug of the present invention, indicated in a general way by numeral 10, is removably positioned within the loops 12 formed on opposite ends of a wire concrete form tie 14,

3

The particular form tie illustrated herein is of the loop-ended, twisted wire type that forms the subject matter of U.S. Letters Patent 2,656,581 and which includes in addition to loops 12, a twisted wire shank or central section 16 and hooks 18 formed in the terminal ends of the wire in position to project on opposite sides of the plane of the loops. The outwardly divergent legs 20 of each loop 12 are provided with nicks or notches 22 that form weakened areas positioned and adapted to break off inside the wall 24 once the concrete has set and the form walls or panels 26 have been removed therefrom by freeing rods 28 from engagement within the loops 12.

The form walls 26, in accordance with the common practice in the concrete-forming art, are usually made of sheeting or plywood panels having a plurality of tie slots 30 provided therein. The loops 12 of the ties are passed through the tie slots 30 and rods 28 are inserted within the projecting end portions of said loops thus preventing the panels 26 from spreading apart. Ordinarily, hooks 18 engage the inside faces of the panels and maintain them in fixed spaced relation; however, when plugs 10 are used as shown herein, they perform this function and the hooks become relatively unimportant other than to prevent the panels from moving toward one another which is unlikely.

The details of the plug construction are best shown in Figures 3-6, inclusive, to which reference will now be had. Plugs 10 have a generally frusto-conical body 32 having grooves 34 formed on opposite sides thereof sized to receive the diverging legs 20 of the form tie loops. The taper of the base is such that the grooves diverge outwardly at about the same angle as the loop legs thus insuring a secure connection therebetween. A deep recess or pocket 36 is formed in the body opening onto the outer end thereof and an integral web 38 intersects the recess dividing it approximately in half. The web 38 is, in turn, preferably formed to include an integral enlargement 40 arranged substantially coaxially in relation to the body and having an extension 42 projecting beyond the outer end of the web.

One of the most important and novel features of the concrete plug of the present invention is the outwardly flaring feathered edge or rim 44 formed integrally on the outer end of the body 32 and which provides the seal against the inner face of the form panel 26. The entire plug is molded from plastic of a type which can be deformed and is slightly resilient. The use of plastic for the plugs serves several important functions, one being that wet concrete will not adhere thereto which eliminates the need for lubrication and overcomes the objectionable feature of residual oil remaining in the pocket left in the wall following removal of the plug which prevents the patch from bonding properly. A second advantage of plastic is that the plugs can be produced quite inexpensively. Another is the fact that the plastic will not swell in the wet concrete like wooden plugs often do making them difficult to remove. There is one outstanding advantage, however, and that is the fact that plastic enables the feathered and flared edge 44 to bend and flare further while conforming with irregularities in the surface of the form panel to form a seal thereagainst. Also, the flared edge is provided with narrow slots 46 communicating with the wider grooves 34 in the body 32 which open onto the front of the plug through said flared portion as shown most clearly in Figure 3. These slots 46 are considerably narrower when the diameter of the wire from which the tie is formed; yet, because the plastic is resilient, the legs of the loop can be passed into the grooves through the slots which widen to receive them. Once the legs of the loop are in place within the grooves, the slots in the flared edge 44 close again around the wire as shown in Figure 1 and effectively block the seepage of wet concrete past the plug and into the tie slot 30 in the form panel or between said plug and panel.

With reference now to all of the figures of the drawing, a few other important features of the concrete plug of the

4

instant invention will be described. In order to insert rods 28 through the tie loops 12, it is frequently necessary to effectively enlarge the loop due to crooked rods or warped panels; however, this becomes a simple operation with the plug of the present invention as the panel can be pushed against the plug until the feathered edge 44 thereof flares and provides more space inside the loop to receive the rod.

When the wet concrete is poured between the form walls or panels 26, the hydrostatic forces exerted thereon tend to stretch the ties and spread the panels apart; however, when this happens, the loops 12 of the form tie become somewhat elongated and the legs 20 thereof move together. This narrowing of the space between the legs 15 of the tie loop in effect squeezes the plug therebetween and forces it outwardly against the form panel which is a novel unique cooperative action between the tie and plug that maintains the sealed relation therebetween.

After the concrete wall 24 has set and it becomes necessary to strip the forms therefrom, the loops of the tie are severed as at 48 in Figure 2; whereupon, the rods can be removed and the panels taken from the wall. Then, the legs 20 of the loops are twisted until they break off inside the wall by reason of notches 22 therein. Thereafter, the plugs are pulled from the wall by either inserting a pair of pliers into the socket 36 and grasping the web 38 thereof between the jaws, or by grasping extension 42 of the enlarged portion 40 between the thumb and forefinger. Finally, the hole in the wall left by the plug is filled and patched with concrete in the well known manner.

These plugs can be reused repeatedly and require no cleaning, oiling or other preparatory treatment. Furthermore, they can be mounted within the loops of the ties by hand and on the job without any special equipment being required.

Having thus described the several useful and novel features of the concrete plug of the present invention, it will be apparent that the many useful objects for which it was designed have been achieved. Although but a single embodiment of the present invention has been illustrated and described in connection with the accompanying drawing, I realize that certain changes and modifications therein may occur to those skilled in the art within the broad teaching found herein; hence, it is my intention that the scope of protection afforded hereby shall be limited only insofar as said limitations are expressly set forth in the appended claims.

What is claimed is:

1. A plug comprising a frusto-conical body having a recess formed in the large end thereof and intersected by a transverse web, an outwardly flaring feathered rim encircling the large end of the body, the body including a pair of longitudinal grooves formed on opposite surfaces thereof and opening through the rim, and the rim having slots in the edge thereof connecting with the grooves.

2. The plug as set forth in claim 1, in which the web includes an enlarged portion running axially in relation to the body and terminating in an extension projecting beyond the web.

3. The plug as set forth in claim 1, in which at least the rim is formed from a resilient material adapted to deform when pressed against a relatively flat rigid surface to provide a seal therebetween.

4. The plug as set forth in claim 1, in which the web is located substantially diametrically in relation to the body and divides the recess into two nearly equal parts.

5. The plug as set forth in claim 1, in which the rim flares in the same direction as the conical surface of the body.

6. In combination, a wire concrete form tie having a twisted central section terminating at each end in a pair of divergent legs interconnected to form loops, and a plug having a longitudinally grooved frusto-conical body inserted between the legs of each loop and cooperating

5

therewith for slidable movement in the direction of the length thereof in response to forces acting to reduce the angle of divergence between said legs.

7. The combination as set forth in claim 6 in which the plug includes a flared rim encircling the large end of the body adapted to seat against the inside surface of a form wall or the like when forced thereagainst by the squeezing action of the legs.

8. The combination as set forth in claim 6 in which the plug body includes a recess in the large end thereof intersected by a transverse web positioned and adapted to prevent collapse of the plug when squeezed between the legs of the loop.

6

9. The combination as set forth in claim 7 in which the flared rim is formed of a resilient material and terminates in a feathered edge adapted to deform and provide a seal when seated.

References Cited in the file of this patent

UNITED STATES PATENTS

1,808,912	Willard	June 9, 1931
2,370,174	Kinninger	Feb. 27, 1945
2,656,581	Gates	Oct. 27, 1953
2,728,127	Armstrong	Dec. 27, 1955