March 20, 1928. 1,663,104

R. T. WALES

WIRE ANCHOR

Filed May 22, 1926 2 Sheets-Sheet 1

Fig. 1.

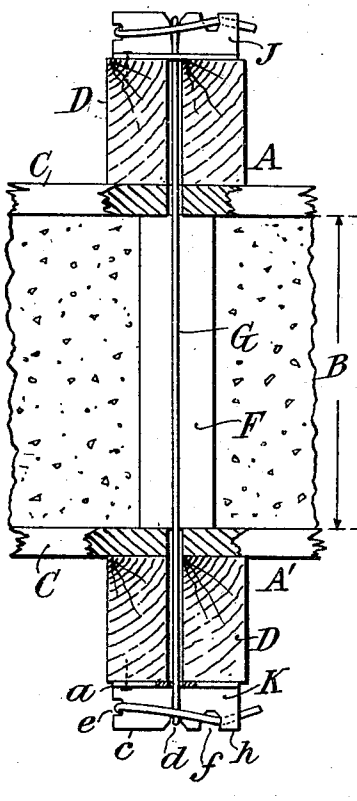


Fig. 2.

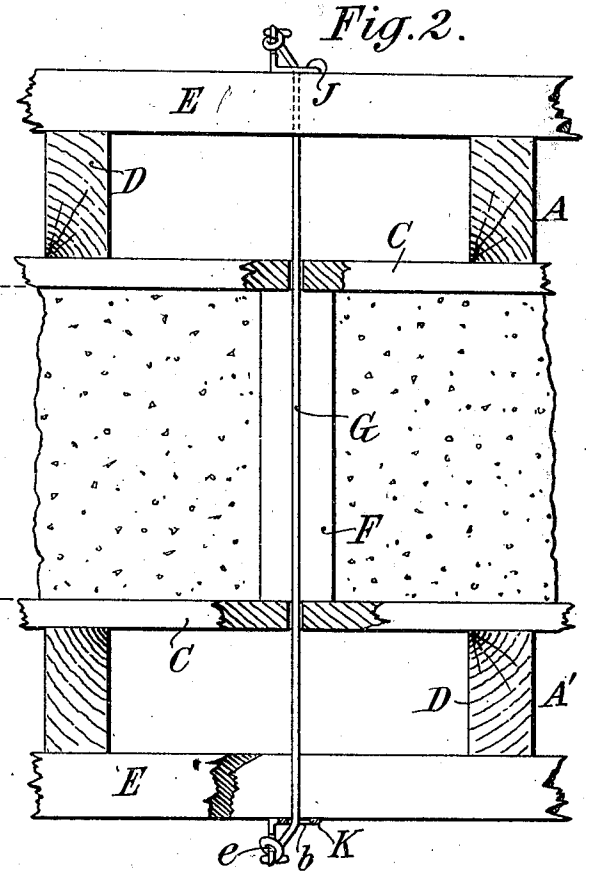


Fig. 3.

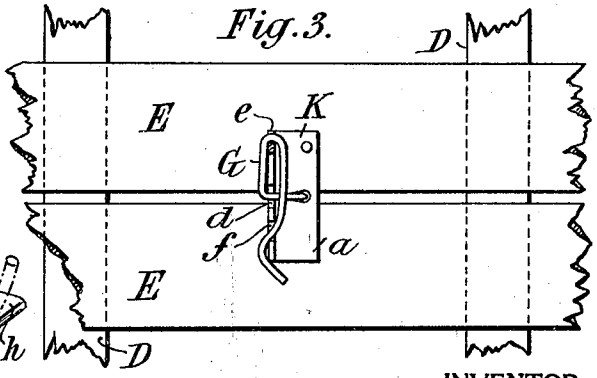
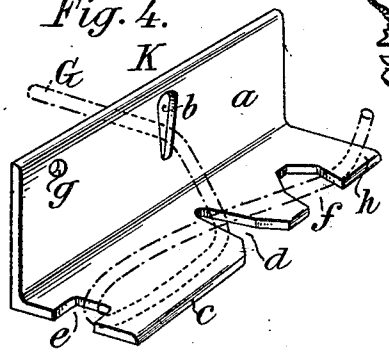


Fig. 4.



INVENTOR

Rowland T. Wales,

By Attorneys,

Fraser, Myers & Manley

March 20, 1928. 1,663,104

R. T. WALES

WIRE ANCHOR

Filed May 22, 1926 2 Sheets-Sheet 2

Fig. 5.

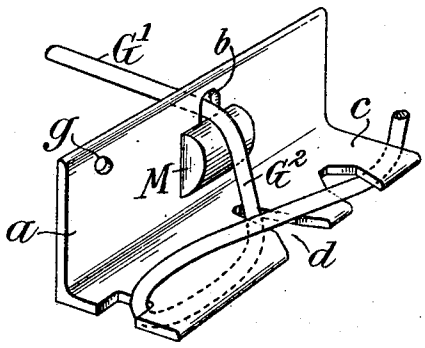


Fig. 7.

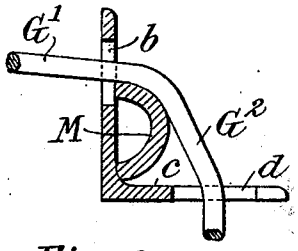


Fig. 6.

Fig. 8.

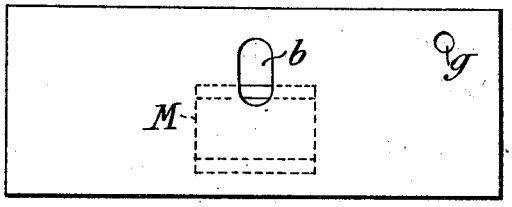


Fig. 9.

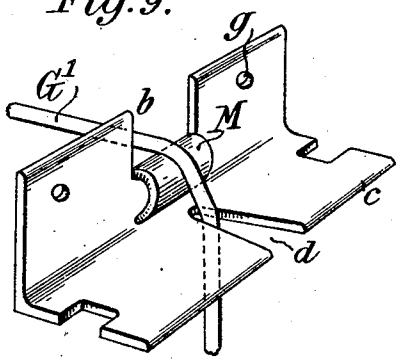
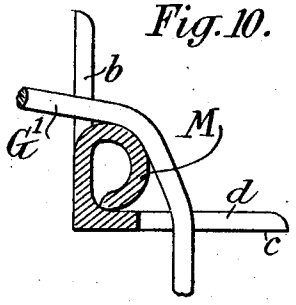


Fig. 10.



INVENTOR :

Rowland T. Wales,

By Attorneys,

Fraser, Myers & Manley

Patented Mar. 20, 1928. 1,663,104

UNITED STATES PATENT OFFICE.

ROWLAND T. WALES, OF NEW ROCHELLE, NEW YORK.

WIRE ANCHOR.

Application filed May 22, 1926. Serial No. 110,902.

This application is in part a continuation of my application Serial No. 405,410, filed August 23, 1920, and of my application No. 638,585, filed May 12, 1923.

This invention relates to wire ties for holding together the opposite sides of concrete forms against internal pressure of the concrete before the latter solidifies. Such wires have been either stretched singly across the mold space, or in most cases a doubled tie wire has been used, and the common practice has been to tighten it by inserting a cross-bar between the wires at the middle and by turning it to twist them after the manner of a tourniquet. For both single and doubled wires also screw tightening means have been proposed, but heretofore none of these have been sufficiently effective to secure wide adoption. The present invention aims to provide an improved construction whereby the tightening is accomplished by means wholly outside of the mold space, and which enables a single wire to be used.

The tie comprises any suitable anchor bearing against one side of the form to which the wire on that side is fastened, and an anchor on the other side of the form (which may or may not be like the first anchor), one or both anchors having integral means for gripping the wire to hold it fast, and means for preventing the escape of the wire from such gripping means.

The anchors to which the present application for patent is directed are commonly used with tightening means by which the wire having been first applied to one anchor on one side of the form, may be tightened and then attached to the second anchor on the other side of the form. The anchor is provided with the said integral means for gripping the wire in order that the wire after being suitably tightened by the operation of the tightener may be transferred to the anchor and gripped by the latter without losing the tension that has been applied to it. The combination of anchor and tightener is claimed in my aforesaid application Serial No. 638,585, to which reference may be made for a full description of the preferred mode of use of the anchors in connection with the special tightener which is claimed in said application.

The present invention in its preferred form is shown in the accompanying drawings, wherein,—

Figure 1 is a horizontal section showing a fragment of a concreting form with the wire tie in place;

Fig. 2 is a horizontal section of a somewhat different construction of mold with the wire tie in place;

Fig. 3 is a front elevation of part of the mold shown in Fig. 2;

Fig. 4 is a perspective view showing one form of anchor;

Fig. 5 is a perspective view illustrating another form of anchor which for certain uses is preferable to that shown in Fig. 4;

Fig. 6 is a perspective view of a saddle forming part of the structure shown in Fig. 5;

Fig. 7 is a transverse section of an anchor of modified construction as compared with Fig. 5, and

Fig. 8 is a back view of the anchor shown in Fig. 7;

Fig. 9 is a perspective view of another construction of anchor having a saddle which is differently constructed from those in Figs. 5 and 7; and

Fig. 10 is a transverse section of the anchor shown in Fig. 9.

Referring first to Figs. 1, 2 and 3, A and A′ are the opposite forms constituting the mold for a concrete wall, the space B between these being the mold space to be filled with concrete. Such forms are commonly made with mold boards or panels C C which usually extend horizontally and are held by upright framing or studs D D of wood or metal. In Fig. 1 the studs D D are arranged in pairs. In Fig. 2 the upright studs D D are more widely spaced, and outside of them are horizontal stretches of strips E E to form a bearing for the tie plates or anchors. With either construction of form a spacing stick F is introduced at intervals to hold the opposite form plates C C apart, these sticks being taken out as the concrete is filled into the mold. These sticks are preferably placed adjacent to the wire ties G G which hold the opposite form walls together and resist the outward or bursting strain of the concrete.

In either construction the wire clamp construction is the same except for the arrangement of the anchors.

J and K are anchors or tie plates to which the opposite ends of the tie wire G are fastened. The anchors J K may be duplicates of one another, as shown, or they may be of different construction. In the construction

shown, which is illustrated in detail in Fig. 4, each anchor consists of a base plate *a* having a flat bearing surface adapted to lie and bear against the flat outer face of the form (either the outer faces of the studs D D in Fig. 1, or of the strips E E in Figs. 2 and 3), which plate has an opening *b* through which the wire passes; attached to the plate *a* is a suitable form of projection adapted for the attachment thereto of the end portion of the wire. In the preferred construction this attaching or cleat portion of the anchor is constructed as a wall *c* projecting from the plate *a* at preferably right angles, and having a notch *d* for receiving and engaging the wire, and notches *e* and *f* for fastening the wire. The construction is such that the anchor may conveniently and cheaply be made by cutting from rolled angle iron and punching the holes and notches. The plate *a* has preferably also a hole *g* near one end, through which a nail may be driven.

The tie wire G is connected or attached to each anchor in the manner shown, namely, by passing its end through the opening *b* and bending it down into the notch *d*, then bending it to one side and carrying it into the notch *e*, thence along the opposite side and into the notch *f*, so that the end portion of the wire is held by the portion *h* of the wall beyond this notch. The opening *b* and the notch *d* are both by preference made with tapered sides, so that the wire being first introduced through the larger portion is drawn between these tapered sides and thereby gripped.

Conceivably the wire might be thus attached to both anchors or cleats J, K, and the tie then put in place before the mold is forced out to its full width, and the tightening of the wire accomplished by thus forcing out the mold until the mold space is of a width equal to the thickness of the concrete wall to be formed, which might be accomplished in various ways, the spacing pieces F being driven in near each tie wire to hold the mold until the concrete is introduced. But for ordinary concreting conditions it is preferable to first attach the wire to one anchor, placing it to one side of the mold, then to pass the wire through and across the mold, thus locating said anchor in place, then to apply the other anchor on the opposite side of the mold, engaging it with the wire, and then by a suitable tightening device to tighten the wire to the desired tension and finally bend it, without relaxing this tension, into engagement with the converging sides of the notch *d*, as above described. For this purpose the special tightening means fully set forth in my aforesaid application Serial No. 638,585, is suitable and constitutes the preferred means for accomplishing this purpose. It is so constructed as to enable the wire without relaxing its tension to be bent down so as to carry it first into the narrower part of the notch *b* and afterward into the notch *d* and into its narrower portion, so that the wire is given a biting engagement in two places, and at the same time by being thus forcibly bent downward under tension is given a set, so that it cannot spring back. If necessary, this biting effect may be increased by striking a blow with a hammer against the wire below the flange *c*, which forces it deeper into the notch *d*. The operator may then release and disconnect the tightener and remove it. To make the fastening of the end portion of the wire more complete and secure, the operator then, by means of pliers or a hammer or otherwise, turns the wire sidewise and bends it up through the notch *e*, then bends it horizontally across the top of the flange *c*, and forces it into the notch *f* and beneath the projection *h*, all as shown in dotted lines in Fig. 4. The wire end is thus so securely attached that it cannot escape from its biting engagement with the notches *b d*.

The operation thus described is very quickly performed and results in the effective tightening of the wire to any desired tension, and its secure anchorage, so that the concrete mold or form cannot open up under the internal or expanding pressure of the wet concrete. When the concrete has set or solidified, and the form (or its lower portion) is to be released, it is only necessary to either unbend the wire or cut it, the latter being the usual course. Then by removing the nail driven at *g* and straightening the cut end of the wire, the anchor or cleat K may be removed and preserved for repeated future use. If the anchor J is of the same construction, this operation may be performed alike on both sides of the mold. The wire may then, if desired, be pulled out from the green concrete before removing the mold. Or, when the mold can be sufficiently removed to give access to the face of the concrete wall, the projecting wires may be cut at the surface or twisted off beneath the surface and the opening pointed over.

In the description of the operation above given, it is understood that the anchor K is applied horizontally against upright studs, as shown in Fig. 1; if the construction of concreting form shown in Figs. 2 and 3 is used, where the anchor is arranged vertically, so as to bear upon two closely adjoining strips E, E, the operation is modified only to the extent that the tightener is swung horizontally to the left (or right) instead of downwardly, in order to draw the wire into the converging notches.

The anchors provided by the present invention are applicable to practically every known construction of concreting forms or molds. The two simple constructions of wooden forms shown in Figs. 1, 2 and 3 are

the ones most commonly used. The invention is, however, equally applicable to sectional metallic forms.

In the construction of anchor thus far described the wire is gripped between converging sides of two openings or notches *b d* formed the one in the base plate *a* which bears against the form or mold, and the other in the right-angle wall *c*. I will now proceed to describe some other constructions of anchor, which vary somewhat from that already described principally in that the gripping of the wire in the primary opening *b* is omitted and the bending of the wire is eased by carrying it over a saddle. This construction avoids a difficulty which has been encountered with certain qualities of wire and under certain conditions, namely, that the rather sudden bend of the wire at its passage through the primary opening *b*, perhaps combined with a slight cutting effect of the converging sides of this notch as the wire is forcibly drawn down into the notch, has been found to somewhat weaken the wire, so that under extreme stress it might be ruptured. While this disadvantage has rarely been encountered, it is nevertheless desirable to guard against it, and for this purpose the improved form of anchor shown in Figs. 5–10 may be used by preference. In each of these anchors the primary opening *b* is made wider than the wire, so that its sides do not engage the wire, and the wire is bent over a saddle M which is rounded so as to support the wire as the latter bends from its stressed portion G^1, where it traverses the mold space, to its inclined portion G^2, where it passes into the tapering notch *d* in the right-angle wall *c*. The rounded exterior face of the saddle M should be given such curve as to ease the bend of the wire and avoid any liability of rupturing the latter under strain. The saddle may be variously constructed; in Figs. 5 and 6 it is shown as a section of half round rod which is applied to the wall *a* of the anchor and attached by spot welding or otherwise. In Figs. 7 and 8 it is formed of plate metal stamped into half round form of the cross-section shown in Fig. 7 and located by one edge entering the bend in the angle iron, the two edges being fastened to the angle iron by arc welding or otherwise. In Figs. 9 and 10 the saddle is formed by slitting and stamping up the metal to form the primary opening *b*, and curling the metal over, as shown, to form the saddle M, it being desirable for fully supporting this saddle portion to carry its edge into the angle between the walls of the angle iron.

For a soft or brittle wire the construction shown in Figs. 5–10 is preferable, it being found that the gripping of the wire in the one notch *d* affords an ample fastening in connection with its frictional engagement with the saddle. If, however, the wire is hard and very tenacious, so that it will endure bending without liability of fracture and so that it does not yield readily to the bite between the converging walls of the notch, then it is preferable to use the form shown in Fig. 4, where the anchor has a double grip upon the wire by reason of the use of two openings with converging walls *b* and *d*. The anchor shown in Fig. 4 is, of course, slightly cheaper than the one shown in Figs. 5–10.

The anchor provided with the present invention is to be distinguished from wire anchors heretofore constructed, in that the anchor has means for engaging or gripping the wire formed as an integral part of the anchor, as distinguished from applying a separate movable wire-fastening means such as a set screw. The anchor of the present invention is also to be distinguished from those constructions for fastening a tensile member for various other purposes than the tie wires of concrete forms or molds, in that the flat bearing surface of the base plate of the anchor lies in a plane perpendicular to the direction of the taut wire, so that it constitutes a bearing resisting the stress applied through the tie wire in the direct line of such stress and to the utmost mechanical advantage; whereas fastening devices having bearing surfaces located in other planes with respect to the direction of the tensile member to be fastened, are inapplicable to such use.

I claim as my invention:

1. An anchor for holding a taut tie-wire for concrete forms comprising a base portion through which the taut wire passes having a flat seating surface in a plane perpendicular to the taut wire, adapted to seat against the form, and integral wire-gripping means including surfaces between which the wire may be drawn, of such angular relation as to grip and mutually hold the wire, and integral means for engaging the wire to prevent its escape from such gripping surfaces.

2. An anchor for holding a taut tie-wire for concrete forms comprising a base portion having a flat seating surface in a plane perpendicular to the taut wire, adapted to seat against the form, and through which the taut wire passes so that its stress is distributed to the form within the area of the base, integral wire-gripping means including surfaces between which the wire may be drawn, of such angular relation as to grip and mutually hold the wire, and an integral anchoring portion around which the wire may be carried to hold it in engagement with such gripping surfaces.

3. An anchor for holding a taut tie-wire for concrete forms comprising a base portion having a flat side in a plane perpendicu-

lar to the taut wire and having an opening through which the wire passes, such opening being within the base portion so that the anchor is seated on opposite sides of the taut wire, and a projecting integral portion having wire-gripping means including surfaces between which the wire may be drawn, of such angular relation as to grip and mutually hold the wire, and integral means for engaging the wire to prevent its escape from such gripping surfaces.

4. An anchor for holding a taut wire for concrete forms, comprising a flat plate in a plane perpendicular to the taut wire, adapted to seat against a form, the anchor having an opening with converging sides adapted to grip and mutually hold the wire when drawn between them, and integral anchoring means for engagement by the wire to prevent its escape from the grip of said converging sides.

5. An anchor according to claim 4, such integral anchoring means being an anchoring projection around which the wire may be carried to hold it in gripping engagement with the converging sides of said opening.

6. An anchor according to claim 4, having a projecting portion in which is the opening with converging sides to grip the wire.

7. An anchor for holding a taut wire for concrete forms comprising a flat plate in a plane perpendicular to the taut wire adapted to seat against a form, and a projecting portion, one of said parts having an opening to be entered by the wire with converging sides of such angular relation as to grip and hold the wire, and one of said parts having anchoring means around which the wire may be carried to prevent its escape from said opening.

8. A wire anchor in the form of an angle plate, one side adapted to lie flat against the form, and the other projecting therefrom, an opening in the former for the passage of the wire, and an opening in the latter with angular sides for engaging the wire, and the anchor formed with integral means for holding the wire in engagement with said latter opening.

9. A wire anchor in the form of an angle plate, one side adapted to lie flat against the form, and the other projecting therefrom and having a middle opening with angular sides for gripping the wire and a lateral notch into which the wire may be carried to hold it fast.

10. An anchor in the form of a rolled angle plate, one of its sides having a punched opening with diverging margins of such sharpness and angular relation as to be adapted to grip the wire, and the anchor formed with integral means for holding the wire in engagement with said opening.

11. An anchor in the form of a rolled angle plate, one of its sides having an opening for the free passage of the taut wire, and the other having a punched tapered opening with sharp-edged angular sides between which the wire may be drawn so related as to grip the wire.

12. An anchor in the form of a rolled angle plate, one of its sides having an opening for the free passage of the taut wire, and the other having anchoring projections around which the wire may be bent, formed with lateral notches adapted to engage and hold the wire.

13. An anchor for a taut tie wire in the form of an angle plate, one of its sides perpendicular to the taut wire and having an opening for the passage of the wire, and the other having means for gripping the wire with an intervening saddle around which the wire may bend.

14. An anchor for a taut tie-wire in the form of an angle plate, one of its sides perpendicular to the taut wire and having an opening for the passage of the wire, and the other having an opening with converging sides to grip the wire, the anchor having a saddle around which the wire may bend.

15. An anchor for a taut tie-wire for concrete forms, comprising a plate adapted to lie flat against a form and having a portion projecting therefrom, the former having a saddle to support the bent wire and the latter having means for gripping the wire.

16. An anchor for a taut tie wire, comprising a plate perpendicular to said wire, the anchor having integral means for gripping the wire and having a saddle over which the taut wire may bend.

17. An anchor for a taut tie wire, comprising a plate perpendicular to said wire, the anchor having integral means for gripping the wire and having a saddle over which the taut wire may bend, said saddle formed as an arched metal portion.

18. An anchor for gripping a taut tie wire comprising a plate perpendicular to said wire, the anchor having a saddle forming an arched wire support over which the taut wire may bend, said saddle formed integrally with the anchor.

19. An anchor for gripping a taut tie wire, comprising a plate perpendicular to said wire, the anchor having a saddle over which the taut wire may bend, said saddle bent up as a slitted portion of the anchor.

20. An anchor for a taut tie-wire for concrete forms, including an elongated base, adapted to bridge across two members of a form and having an opening therethrough for a wire entering from between said members, and an angularly projecting portion around which the end portion of the wire may be bent to secure it to the anchor.

21. An anchor for a taut tie-wire for concrete forms in the shape of an angle plate, one side adapted to lie flat against the form,

and the other side projecting therefrom, an opening in the former for the wire, and an opening in the latter for receiving the wire coming from the former, at least one of said openings having converging sides of such angular relation as to grip and hold the wire when drawn between them, and integral means for retaining the wire in the grip of such converging sides.

22. An anchor according to claim 21, the latter side having notches into which the wire may be carried to hold it fast.

23. An anchor for a taut tie wire for concrete forms, comprising a base portion having a flat seating surface in a plane perpendicular to the taut wire and an opening for the taut wire, whereby the latter may pass through such seating surface, integral wire gripping means, and means around which the end portion of the wire may be bent to secure it to the anchor.

24. An anchor for a taut tie wire for concrete forms, comprising a base portion having a flat seating surface in a plane perpendicular to the taut wire and an opening for the taut wire, whereby the latter may pass through such seating surface, and having an opening for receiving the wire coming from said opening, and integral means around which the end portion of the wire may be bent, at least one of said openings having converging sides adapted to grip and hold the wire when drawn between them.

25. An anchor for a taut tie wire for concrete forms in the shape of an angle plate, one side adapted to lie flat against the form in a plane perpendicular to the taut wire, and the other side projecting therefrom, openings for the wire in the respective sides and notches in the projecting side into which the end portion of the wire may be bent to secure it to the anchor.

In witness whereof, I have hereunto signed my name.

ROWLAND T. WALES.