May 14, 1935. S. S. COLT 2,001,052

RETAINING TIE FOR CONCRETE FORMS

Filed Dec. 6, 1932 2 Sheets-Sheet 1

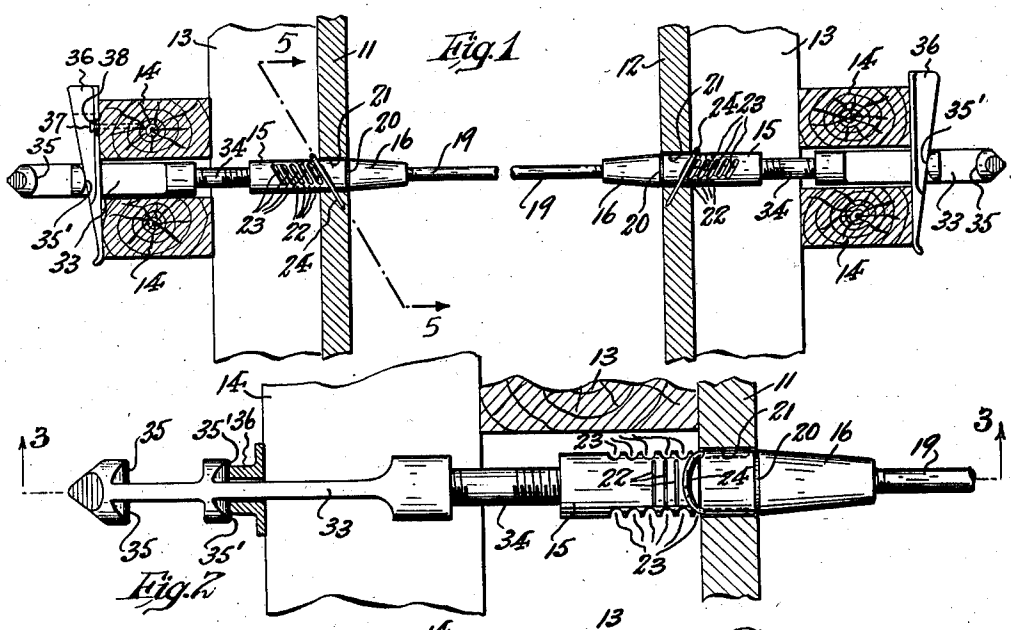


Fig. 1

Fig. 2

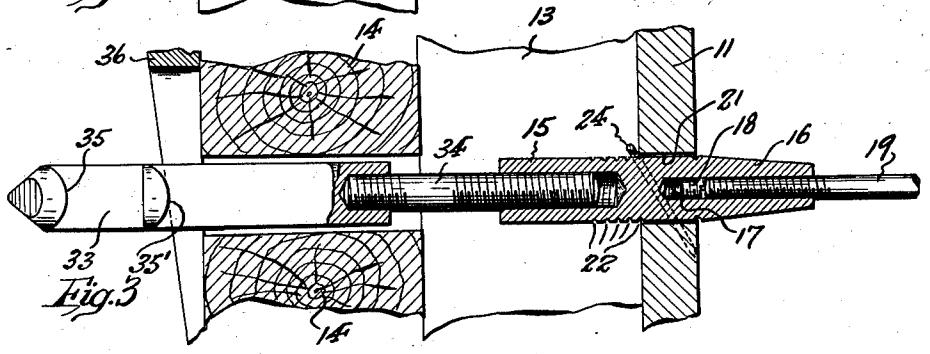


Fig. 3

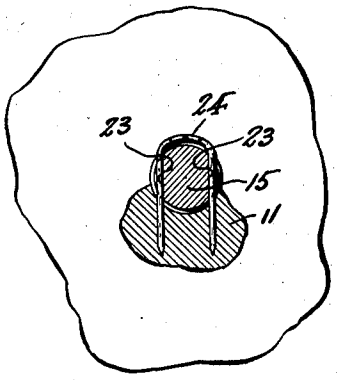


Fig. 5

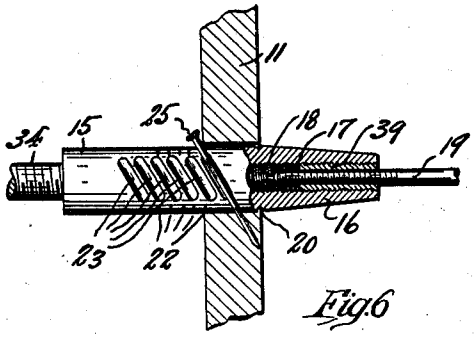


Fig. 6

INVENTOR

Samuel S. Colt,

BY

George D. Richards

ATTORNEY

May 14, 1935. S. S. COLT 2,001,052

RETAINING TIE FOR CONCRETE FORMS

Filed Dec. 6, 1932 2 Sheets-Sheet 2

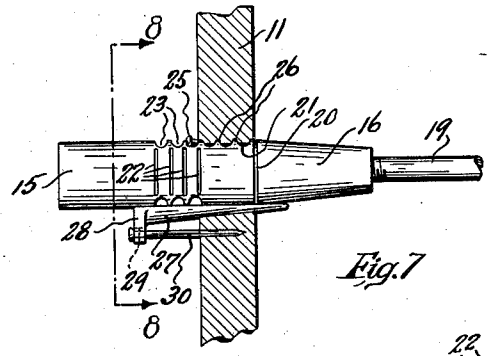
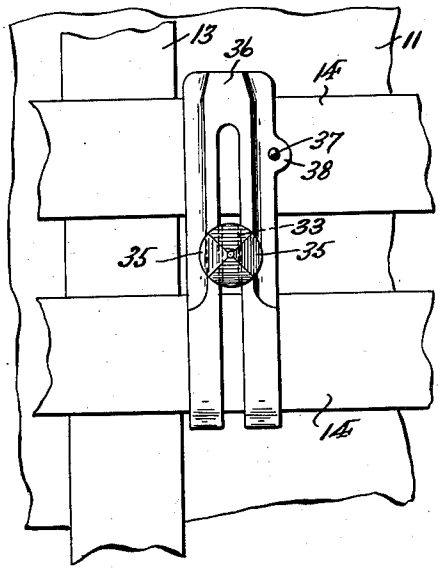


Fig. 7

Fig. 4



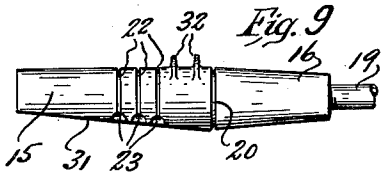
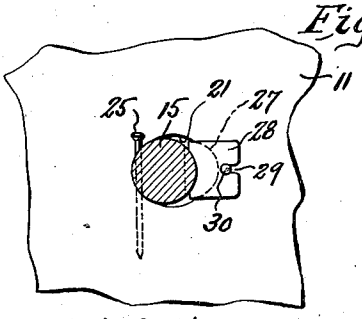


Fig. 9

Fig. 8



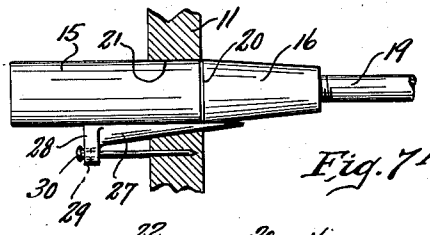


Fig. 7A

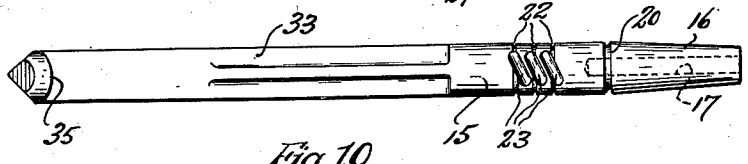


Fig. 10

INVENTOR
Samuel S. Colt,
BY
George D. Richards
ATTORNEY

Patented May 14, 1935

2,001,052

UNITED STATES PATENT OFFICE

2,001,052

RETAINING TIE FOR CONCRETE FORMS

Samuel S. Colt, Orange, N. J.

Application December 6, 1932, Serial No. 645,918

3 Claims. (Cl. 25—131)

This invention relates to improvements in retaining tie for holding the walls of concrete casting forms in operative assembled relation.

This invention has for its principal object to provide a novel retaining tie for holding opposed walls of concrete casting forms in desired predetermined spaced relation, the novel retaining tie being so constructed and arranged that the same is capable of being manipulated from the exterior sides of the form, and is furthermore adapted to provide a tie functioning to retain the form walls both against outward and inward movement or displacement relative to the desired predetermined spaced relation thereof, the structure being such that necessity for employing separate internal spreader devices within the form interior and between the walls thereof is entirely avoided.

Another object of this invention is to provide a novel means to couple tie-rods between opposed form walls, such means being manipulatable, when either erecting or dismantling the form, from the exterior sides of the form walls.

Another more specific object of this invention is to provide a retaining tie means which is readily adjustable to accommodate the same to fit various thicknesses of form walls and various sizes of battens and walers applied to said walls to support and reenforce the same.

This invention has for a further object to provide form wall retaining tie means comprising parts which are capable of repeated use, and which are also capable of easy and quick separation from a concrete casting upon dismantling the form in which the latter has been cast.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the invention.

Illustrative embodiments of this invention are shown in the accompanying drawings, in which:—

Fig. 1 is a fragmentary transverse section taken through opposed form walls, showing one form of the novel retaining tie means of this invention in operative assembled relation thereto; Fig. 2 is a horizontal section through one form wall and the retaining tie means cooperating therewith, this view being drawn on an enlarged scale; Fig. 3 is in part a side elevation and in part a vertical longitudinal section, taken on line 3—3 in Fig. 2; Fig. 4 is an outer end view of the novel retaining tie means, drawn on an enlarged scale; Fig. 5 is a fragmentary transverse section, taken on line 5—5 in Fig. 1, but drawn on an enlarged scale.

Fig. 6 is a fragmentary view in part side elevation and in part longitudinal section, showing a modified arrangement of the connection between a tie rod end and retaining devices.

Fig. 7 is a fragmentary top side elevation of a modified construction of retaining means, utilizing a wedge element to bind the same to a form wall; Fig. 7A is a similar view showing a further modified form of such arrangement; Fig. 8 is a fragmentary transverse section, taken on line 8—8 in Fig. 7; and Fig. 9 is a top side elevation of a further modified form of retaining means for use with a binding wedge element.

Fig. 10 is a side elevation of a one-piece form of the novel retaining means to engage tie rods in connection with a form.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

Referring to the drawings, the concrete casting form comprises side walls 11 and 12 to be spaced apart in opposed relation. Upright members or battens 13 are applied, at suitable intervals, contiguous to the exterior faces of the side walls 11 and 12 to provide external aligning support for the boards or planks which usually compose said side walls. Extending transversely across the battens 13 are walers 14, which are ordinarily arranged in pairs, the members of which are preferably spaced apart one above the other.

The novel retaining tie, in one embodiment thereof, comprises a pair of rod supporting couplers, one of each such pair being being associated with the respective opposed side walls 11 and 12, in oppositely longitudinally aligned relation one to another. The said rod supporting couplers and locking means therefor being alike, detail description of one will also apply to the other. Each rod supporting coupler comprises an elongated main body 15, preferably of cylindrical form, the same being made of metal as the preferred material therefor. Said main body is provided at its inner end with a tapered or conical end portion 16. Entering axially from the extremity of said tapered or conical end portion into the same is an internally threaded bore 17. Screwed into said bore 17 so as to be adjustably movable and positioned therein is an abutment piece or stop member 18, which may be moved within said bore 17 so as to be spaced from the extremity of the tapered or conical end portion a given or known distance. For the purpose of illustration, the position of said stop

member 18 may be adjusted to dispose the same at a distance of two inches from the extremity of the conical end portion 16, so that a tie rod 19 of selected length can only enter said bore 17 for a distance of two inches, at which distance of penetration it is stopped by abutment against said stop member 18. At the juncture of the conical end portion 16 with the body 15 there is provided an external indicating mark 20 suitably applied thereon, and which in preferred form consists in an annular groove, as shown. The conical end portions will be of known predetermined length, and when inserted through openings 21 in the form walls with a tie-rod engaged therebetween at known predetermined distances of penetration into the bores of said conical end portions the over-all length between the marks 20 of opposed conical end portions connected by the intervening tie rod may be easily predetermined to correspond to the distance of spacing desired to be maintained between the opposed form walls 10 and 12.

In some forms it may be desired to use thicker wall stock than in others; e. g. in some cases 7/8" boards are employed, in others 1¼" boards, in others 1½" boards and in others 1¾" boards, etc. In order to readily adjust the tie rod retaining couplers to boards of various thicknesses to the end that the inner faces of the form walls may be assuredly in desired spaced apart relation, the exterior surface of the body 15, adjacent to its conical end portion 16, and in relation to the mark 20, is provided with a series of gauge marks 22 individually corresponding to side wall thicknesses. These gauge marks are selectively registrable with the exterior face of side wall boards of selected thickness, and indicate to the form assembling operator when the coupler is properly positioned relative to such side wall boards to assure the proper projection of the conical end portion 16 relative to the inside face of such side wall boards. A novel means is provided for initially securing the coupler in adjusted operative relation to a form wall. This means comprises the provision of inwardly inclined guide passage means on one or both sides of the body 15, whereby a fastening element, such as a nail, staple or the like, can be driven therethrough from the outside of the form and into the material of the form wall, thus fixing the coupler body in desired operatively disposed position relative to the form wall with which it is to be associated. The marked advantage of this arrangement is that the setting and securing of the coupler body in place may all be accomplished from outside the form, and all stops, abutments or like devices operative within the form interior and in cooperation with the inside face of the form wall are eliminated, while nevertheless the retaining tie, by virtue of such secured relation to the form walls serves as a spreader to hold the walls against inward displacement from desired spaced relation, without necessity for using additional or separately applied spreader devices within the form interior and between the walls thereof. Preferably the inclined guide passage means comprises a series of oblique channels or passages 23 extending downwardly and inwardly along at least one side of the coupler body and spaced to dispose individual channels or passages at distances from the conical end portion 16 corresponding approximately to the various thicknesses of wall sides which are selectable for use in given cases. When the coupler body is passed through an opening 21 of a form wall, and properly positioned in relation thereto, nails, staples or like fastening means are passed downwardly through selected channels or passages 23, so as to be guided by the inward and downward inclination of the latter to meet the material of the form wall within or adjacent to the opening 21, whereby such fastening means may be driven into the wall material to thereby affix the coupler body against shifting displacement relative to the wall. The channels or passages 23 may be provided upon opposite sides of the coupler body, as shown in Figs. 1, 2, 3 and 5, so that a staple 24 may be driven through corresponding channels or passages 23 on opposite sides of and so as to straddle said coupler body in holding relation thereto. Instead of the staple 24, an ordinary nail or spike 25 may be employed, as shown in Figs. 6 and 8, at one or at both sides of said coupler body. The channels or passages 23 may be omitted from one side of the coupler body, if desired, since a single nail will in most cases hold the latter adequately secured against displacement from its operatively disposed relation to a form wall.

Another arrangement for initially securing the coupler body in adjusted operatively connected relation to a form wall, comprises a binding wedge means. One arrangement thereof illustrated in Figs. 7 and 8 contemplates extending grooves or channels on one side of the body 15 toward the conical end portion 16 so as to provide projections 26 contiguous to one side of an opening 21 in which the body 15 is inserted. A wedge member 27 is then driven parallel with the body 15 between the latter and the opposite side of the opening 21 so as to enter the latter, and by its wedging action exert a side thrust upon the body 15 adapted to imbed the projections 26 in the material of the wall, thus firmly binding the body 15 against displacement from operative assembled relation to and with the form wall. Preferably the wedge member 27 is provided with a head 28 for driving the same, and to provide a laterally projecting flange having a notch or opening 29 through which a fastening nail 30 may be driven into the form wall to thus retain the wedge from relaxing from its operative holding position. The use of such fastening nail is optional however. As shown in Fig. 7A, the grooves or channels 23 together with the formed projections 26 may be omitted from the body 15 when the holding wedge member 27 is used, in which case the frictional binding effect exerted by the wedge member is depended upon for holding the body in place. This latter arrangement would, in many cases, be entirely satisfactory, especially in connection with forms of comparatively small size. In Fig. 9 there is shown a somewhat modified form of coupler body adapted especially to cooperate with a wedge member fastening means in the general manner above explained. In this modified form, the coupler body 15 is provided at one side with a longitudinally disposed inclined face 31 to outwardly taper one side of the body for cooperation with a wedge member 27 to be slidably engaged with said face 31. If desired, the coupler body may be provided, on the side opposite to that having said inclined face 31 and at a point thereof adjacent to the conical end portion 16, with one or more lateral projections or teeth 32 adapted to bite into the side of an opening 21 in which the coupler body is disposed, when the body is wedged therein by the pressure of the wedge member 27.

For some classes of work, particularly in the

lighter and smaller types of forms, the coupler bodies, with intervening tie rod, may be used without additional locking or fastening means cooperative with the form side structure, but for heavier work especially, requiring comparatively heavy and large size forms, additional locking means are provided in connection with the outer ends of the coupler bodies. In preferred form, the locking devices consist in a tail-piece **33** adjustably connected with the outer end of the coupler body **15** by a shank **34**, one end of which is secured to the inner end portion of the tail-piece and the other end of which is screwed into the outer end of the coupler body **15** so as to be longitudinally adjustable in relation thereto. Said tail-piece **33** extends outwardly between the spaced walers **14** and is provided at its sides with one or more sets laterally projecting abutment bosses **35** and **35'**. Cooperating with the tail-piece is a bifurcated locking wedge **36**, the legs of which are adapted to straddle the tail-piece and abut a pair of said abutment bosses, as e. g. **35'** in Figs. 1 to 3 inclusive of the drawings, with the inner face of said locking wedge engaging the outer sides of said walers **14**. By driving down the wedge **36**, the walers **14** and through them the battens **13** are tightly thrust in operative bearing or supporting relation to the outer sides of the form walls **11** and **12**, whereby the same are secured by the retaining tie means against outward displacement from their operative form limiting positions. The wedge may be secured against displacement by driving a nail **37** through a perforate ear **38** with which a margin of the wedge is provided, and thence into the adjacent waler **14**, as shown in Figs. 1 and 4. Since it is sometimes desired to employ battens or walers or both of extra large size or dimensions, the extra set of abutment bosses **35** may be more conveniently employed to support the locking wedge in holding relation thereto, and, the tail-piece may be lengthened or shortened as required to fit selected sizes of walers, etc., by adjusting the shank **34** relative to the coupler bodies **15**, as will be obvious.

As shown in Fig. 10 the tail-piece **33** may be formed in one piece with or as an integral part of the coupler body **15**.

It will also be obvious, that other forms of locking means specifically different from the tail-piece having the abutment bosses for cooperation with a locking wedge may be utilized, so long as the same effectively engages and thrusts the walers and battens into operative supporting relation to the form wall with which the same are assembled.

Attention is invited to Fig. 6, wherein is shown a method of attaching tie rods of reduced diameter to the conical end portion **16** of the coupler body, such method comprising the provision of a reducing bushing or sleeve **39**, externally threaded to fit the bore of the conical end portion and bored and internally threaded to accommodate the threaded end of a tie rod of selected reduced diameter.

After concrete is cast in the assembled form and has set sufficiently to warrant the dismantling of the form, the walls of the latter may be released and taken down by releasing and removing the wedge **36**, whereupon the walers **14** and battens **13** may be removed. The coupler bodies may thereupon be turned, by application of a Stillson wrench to their outer end portions, to thereby unscrew the same from the end of the tie rod which remains imbedded in the wall. This operation withdraws the conical end portion **16** of the coupler body from the concrete wall. The form side walls **11** and **12** may be stripped from the surfaces of the concrete wall, and then the cavities, left in the latter by the removal of the conical portions **16** of the coupler bodies therefrom, may be filled and pointed up so as to leave a smooth and unpitted concrete wall surface.

While I have described the use of the coupler bodies at each end of the tie rod, there may be occasions when such bodies, and the locking devices cooperating therewith, are employed at only one end of the tie rod and only at one side of the form, the opposite end of the tie rod being otherwise anchored or engaged with the form parts comprising the opposite side of the complete form.

I am aware that many variations, other than those already mentioned, may be made in the above described constructions and that many widely different embodiments of this invention could be made without departing from the scope thereof; it is therefore intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In retaining means for concrete forms, a removable coupler means adapted to penetrate a form wall from the exterior thereof to partially extend into the form space to be there detachably connected to a tie rod disposed across the form interior, means directly interconnected between said coupler means and the form wall to affix the former to the latter both in operative predetermined position relative thereto and against turning, said latter means comprising at least one oblique passage provided in a side of said coupler means to incline toward the exterior face of said wall, and a fastening means manipulatable from the exterior of the form wall so as to be driven through said passage and into the wall.

2. In retaining means for concrete forms, a removable coupler body adapted to penetrate a form wall from the exterior thereof and having a conical end portion to extend into the form space to be there detachably connected to a tie rod disposed across the form interior, said coupler body having a plurality of spaced oblique passages on opposite sides thereof to incline toward the exterior face of said wall, and a staple manipulatable from the exterior of the form wall so as to be driven through a selected pair of passages in embracing relation to said coupler body and thence into said wall to affix said coupler body both in operative predetermined position relative to said wall and against turning.

3. In a retaining means for concrete forms, a removable coupler body adapted to penetrate a form wall from the exterior side thereof and having a conical end portion to extend into the form space, said conical end portion having a longitudinally internally threaded bore, and an adjustable stop means threaded into said bore to limit the projection of a tie rod end entered into said bore for detachable connection with said conical end portion.

SAMUEL S. COLT.