Sept. 2, 1958 B. HILLBERG 2,849,780

INNER CORNER FORMING UNIT FOR A CONCRETE WALL FORM

Filed May 3, 1955 2 Sheets-Sheet 1

Fig. 1

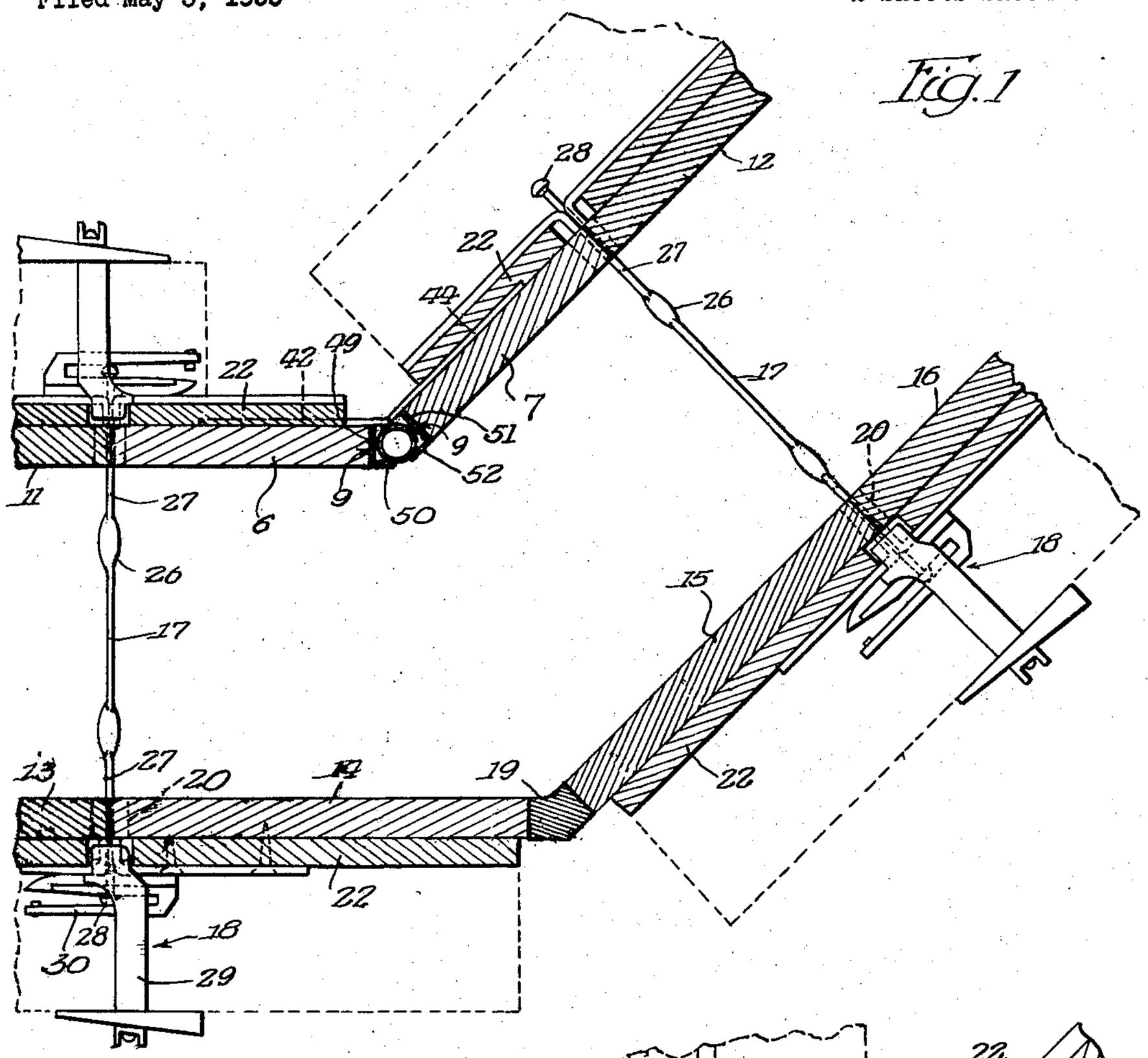


Fig. 2

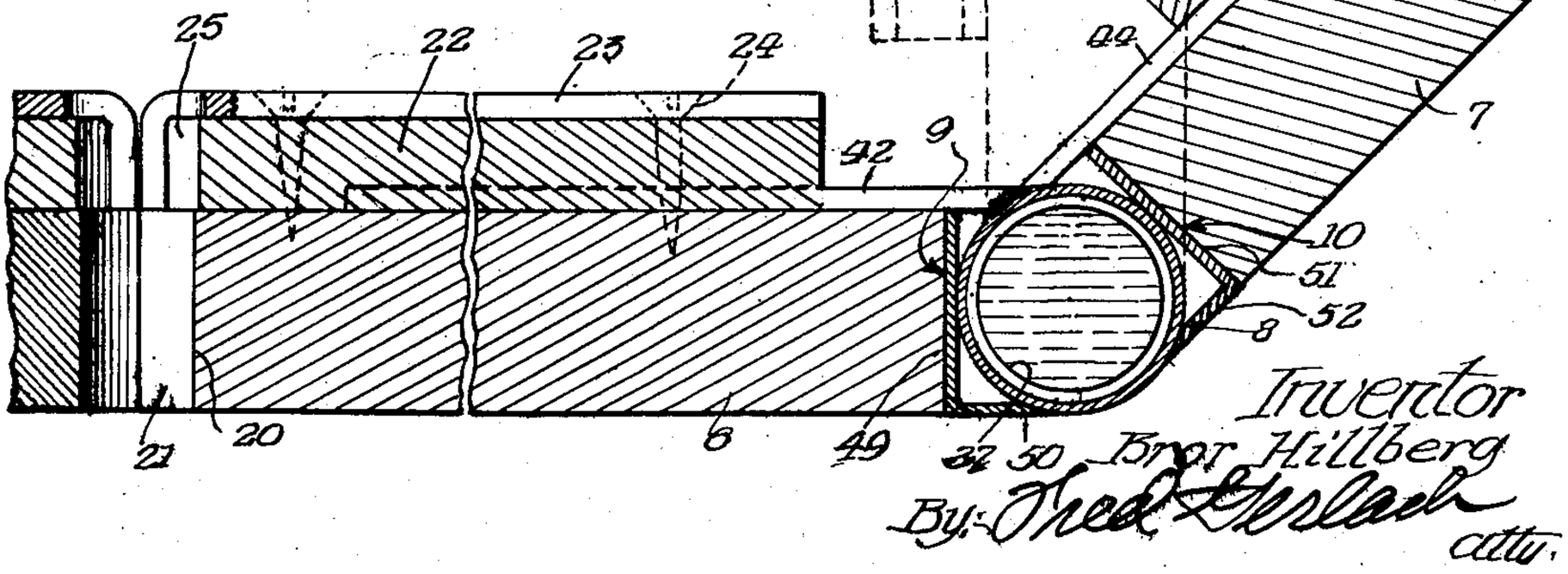


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Fig. 3

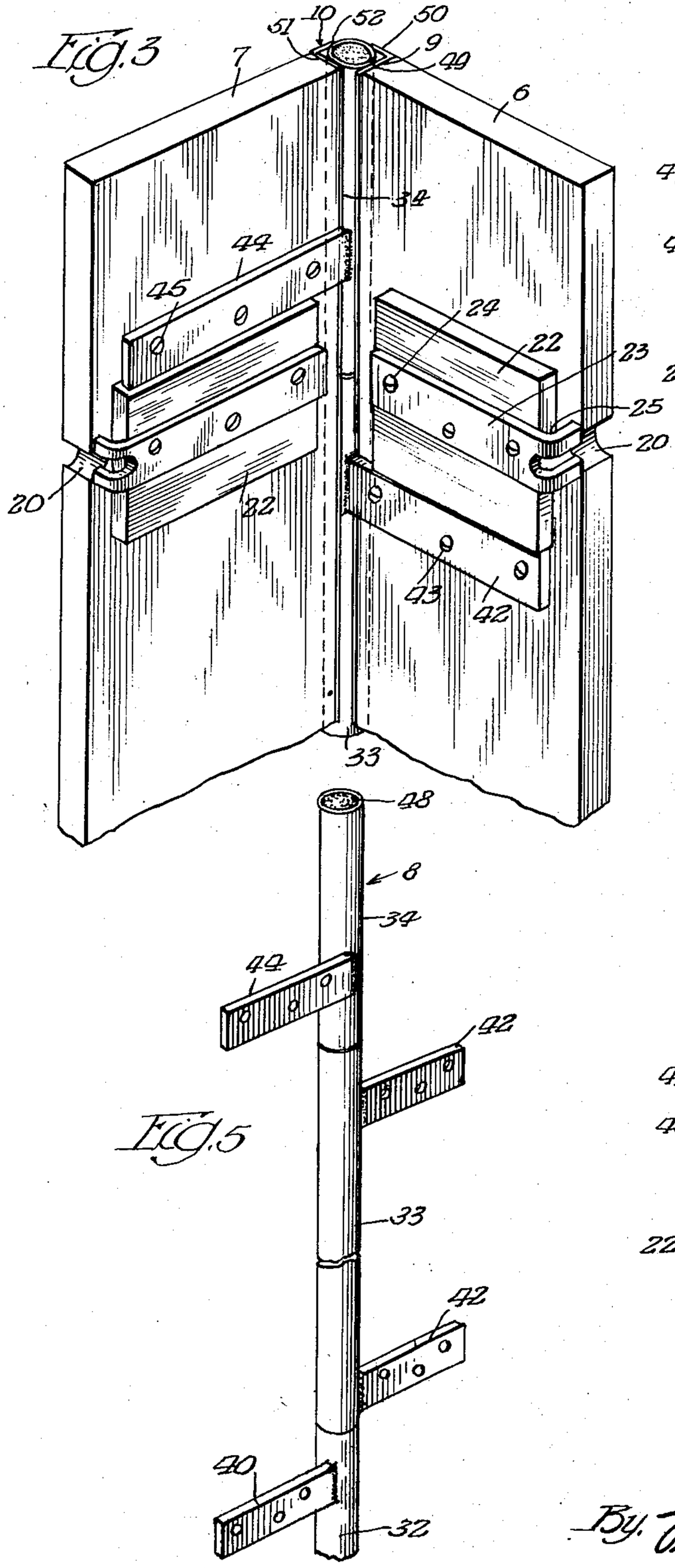
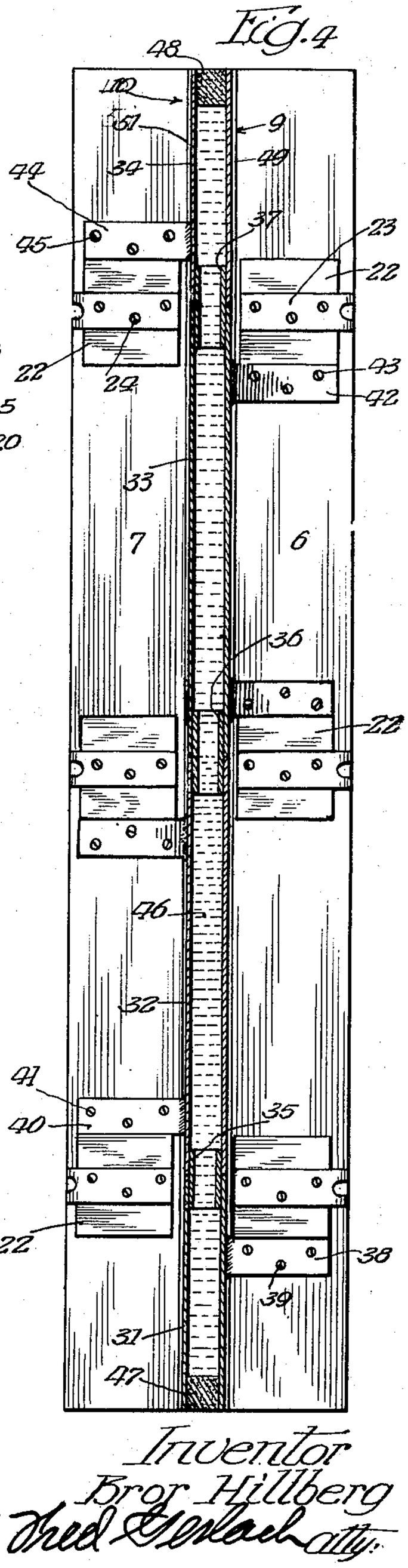



Fig. 5

Fig. 4

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# INNER CORNER FORMING UNIT FOR A CONCRETE WALL FORM

Bror Hillberg, Chicago, Ill.

Application May 3, 1955, Serial No. 505,570

3 Claims. (Cl. 25—131)

The present invention relates generally to wall forms. More particularly, the invention relates to that type of wall form which is designed for use in the formation of a concrete wall and comprises: (1) a series of upstanding edge to edge rectangular panels which are formed of plywood or other suitable material and have oppositely disposed hole forming notches in the abutting side edges thereof; (2) a second series of similar upstanding rectangular panels which are disposed in opposed but spaced apart relation with the panels of the first series; (3) horizontally positioned combined tie and spreader rods which extend between and at right angles to the two series of panels and have the ends thereof projecting through and beyond the notch formed holes between the abutting side edges of the panels; and (4) removable clamping devices which are associated with the ends of the combined tie and spreader rods and serve when in place to hold the panels in fixed relation with the ends of the rods.

In connection with use of a concrete wall form of the aforementioned type it is necessary when the wall to be formed is to have a right angle or other bend to arrange certain of the panels of one series at an angle with respect to the other panels of the one series and correspondingly to arrange the panels of the other series. Heretofore, difficulty has been experienced in positioning and connecting together the two panels that serve to form the inside corner of the bend in a bent wall.

One object of this invention is to provide in connection with a concrete wall form of the type under consideration an inside corner forming unit which involves a simple and novel construction and effectively and efficiently fulfills its intended purpose. Generally speaking, the improved unit comprises a pair of side by side upstanding panels and a particular hinge connection whereby the two panels are connected together so that they may be positioned relatively to one another at any desired angle between and including 90 and 180°.

Another object of the invention is to provide an inside corner forming unit in which the hinge connection between the two upstanding panels comprises a vertical series of tubes which are positioned between the adjacent or inner side edges of the panels, have the adjoining ends thereof rotatively connected together so that they are capable of turning relatively to one another, and have horizontally positioned radially extending brackets certain of which are connected to certain of the tubes and fit against, and are secured to, the outer face of one of the panels and the others of which are connected to the other tubes and fit against, and are secured to, the outer face of the other panel.

Another object of the invention is to provide an inside corner forming unit in which the two panels are provided with full length angle bars certain legs of which fit flatly against, and are secured to, the adjacent side edges of the panels and the other legs of which are arranged in coplanar relation with the inner faces of the panels, project outwards at right angles to the adjacent side edges to the panels, have their outer side edges in sliding engagement with the inner side portions of the outer surfaces of the tubes of the hinge connection, and serve as seals for preventing leakage of concrete past the hinge connection.



A further object of the invention is to provide an inside corner forming unit of the type and character under consideration in which the tubes of the hinge connection are rotatively connected together by sleeves and are filled with a lubricant so as to facilitate relative turning movement thereof.

A still further object of the invention is to provide an inside corner forming unit which is of such simple construction that it may be produced at a comparatively low cost.

Other objects of the invention and the various advantages and characteristics of the present inside corner forming unit will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by the claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a fragmentary horizontal section of a concrete wall form having as a part thereof an inside corner forming unit embodying the invention, the two panels of the unit being positioned relatively to one another at an angle of 135°;

Figure 2 is an enlarged horizontal section of the inside corner forming unit, illustrating in detail the manner in which the outwardly projecting legs of the full length angle bars coact with the inner side portions of the outer surfaces of the tubes of the hinge connection so as to prevent leakage or outflow of concrete past the hinge connection;

Figure 3 is a fragmentary perspective of the inside corner forming unit, the panels of the unit being shown as extending relatively to one another at a 90° angle;

Figure 4 is an outside side elevation of the complete inside corner forming unit, the panels of the unit being shown as extending relatively to one another at an angle of 180° and the tubes of the hinge connection between the two panels being shown in section for purposes of illustration; and

Figure 5 is a fragmentary perspective of the hinge connection whereby the two panels of the inside corner forming unit are connected together so that they may be positioned relatively to one another at any desired angle between and including 90 and 180°.

The inside corner forming unit which is shown in the drawings constitutes the preferred form or embodiment of the invention. In general, the unit comprises a pair of side by side upstanding panels **6** and **7**, a hinge connection **8** between the two panels and a pair of angle bars **9** and **10**. As shown in Figure 1 of the drawings the unit together with a pair of panels **11** and **12**, a series of panels **13**, **14**, **15** and **16**, combined tie and spreader rods **17** and releasable clamping devices **18** is adapted to provide a form for use in the formation or fabrication of a concrete wall having a bend in it. As hereinafter described in more detail, the unit in connection with use of the concrete wall form as a whole is adapted to form the inside corner of the bend in the concrete wall that is formed by way of the form. Normally in connection with use of the unit the two panels **6** and **7** are angularly positioned with respect to one another as shown in Figures 1 and 3. The amount or degree of angularity of the panels **6** and **7** determines the character or amount of the bend of the concrete wall. The panel **11** is positioned in edge to edge relation and alignment with the

panel **6** of the inside corner forming unit and the panel **12** is in edge to edge relation and alignment with the panel **7**. The four panels **13**, **14**, **15** and **16** are positioned opposite to the panels **11**, **6**, **7** and **12**, are arranged in edge to edge relation, and form a second series of panels in opposed but spaced apart relation with the first mentioned series of panels. In connection with use of the form, the panels **14** and **15** are positioned at the same angle as the panels **6** and **7** of the inside corner forming unit and are provided between their adjacent or oppositely disposed side edges with a filler strip **19** which is suitably secured in place. The combined tie and spreader rods **17** and the removable clamping devices **18** serve as well understood in the art to hold the two series of panels in fixed spaced apart relation. It is contemplated that the two series of panels will be spaced apart a distance corresponding to the desired thickness of the concrete wall to be formed therebetweeen and also that after proper positioning of the two series of panels concrete in plastic or unset form will be poured between the two series for wall forming purposes. After setting or hardening of the concrete the form is dismantled and then the projecting ends of the combined tie and spreader rods are severed or broken at points adjacent to the sides of the concrete wall. The adjacent vertical edges of the panels **14** and **13**, and **15** and **16** respectively of the inside corner forming unit are preferably formed of plywood and have oppositely disposed semi-circular notches **20** formed in their abutting side edges. Each oppositely disposed pair of notches forms a circular hole **21** for receiving one end of one of the combined tie and spreader rods **9**. The plywood panels **11**, **6**, **7**, **12**, **13**, **14**, **15** and **16** are reenforced by horizontally extending boards **22** which extend across the outer faces of the panels and are secured in place in any suitable manner. The boards **22** are preferably positioned so that the imaginary longitudinal center lines thereof arein alignment with the semi-circular notches **20** in the side edges of the panels. As shown in the drawings the end edges of the reenforcing boards **22** are disposed a small distance inwards of the side edges of the panels. Each of the reenforcing boards is provided on its outer surface with a horizontally extending metallic strip **23**. Such strips are located midway between the upper and lower edges of the reenforcing boards and are fixedly secured in place by way of screws **24**. Certain ends of the strips **22** are bent inwards at substantially right angles so as to form elongated vertically extending open ended sockets **25** adjacent to the semi-circular notches **20**.

The combined tie and spreader rods **17** extend between and at right angles to the two series of panels and are arranged so that the ends thereof project through and an appreciable distance beyond the notch-formed holes **21**. The portions of the combined tie and spreader rods that are disposed inwards of the inner faces of the panels are provided with flats **26** and weakness points **27** outwards of the flats. The extremities of the rods are provided with heads **28**. The removable clamping devices **18** are associated with the ends of the rods respectively. They serve to clamp the panels of the form in edge to edge relation and also to hold the panels in fixed or rigid relation with the ends of the rods **17**. As shown in Figure 1 the removable clamping devices comprise brackets **29** and U-shaped locking bolts **30**. The brackets **29** are horizontally elongated, extend at right angles to the panels and embody at their inner ends pairs of spaced apart depending fingers (not shown) which fit within the aforementioned elongated vertically extending open ended sockets **25**. The U-shaped locking bolts **30** of the removable clamping devices **18** are slidably mounted on the inner ends on the brackets **29** and are adapted when driven in the direction of their open ends to be brought into straddled relation with the heads **28** on the extremities of the combined tie and spreader rods **17**. For a more detailed description of the construction, arrangement



and mode of operation of the combined tie and spreader rods **17** and the removable clamping devices **18** reference may be had to my copending United States patent application Serial No. 500,107, filed on April 8, 1955, and entitled "Concrete Wall Form."

The panels **6** and **7** of the inside corner forming unit are the same in height and width, have flat inner and outer faces and as previously pointed out are connected together by the hinge connection **8** so that they may be positioned relatively to one another at any desired angle between and including 90 and 180°. They are the same in thickness, and so far as configuration or shape is concerned, are rectangular.

The hinge connection **8** comprises a vertical series of tubes **31**, **32**, **33** and **34**. Whereas but four tubes have been shown or illustrated, it is to be understood that more or less may be employed depending upon the height of the panels **6** and **7**. The series of tubes is the same in height as the panels and is located between the adjacent side edges of the panels. The tubes of the hinge connection are preferably formed of steel. They are positioned in end to end and abutting relation and are rotatively connected together by pivot sleeves **35**, **36** and **37**. As shown in Figures 4 and 5, the tubes are the same in diameter and thickness. The tube **31** is located at the lower end of the series and embodies adjacent its upper end a horizontally positioned radially extending bracket **38**. The latter fits flatly against the outer face of the panel **6** immediately below and preferably in contact with the lower edge of the adjacent board **22** and is fixedly secured to such panel by way of screws **39** which extend through holes in the bracket **38** and into the panel **6**. The inner or proximal end of the bracket **38** is welded to the tube **31** adjacent the upper end thereof. The tube **32** is positioned directly above the tube **31** and is rotatively connected to the latter by way of the pivot sleeve **35**. The upper end of such pivot sleeve fits within, and is connected by a drive fit to, the lower end of the tube **32** and the lower end of the pivot sleeve **35** fits loosely within the upper end of the tube **31**. The opposite end regions of the tube **32** are provided with horizontally positioned radially extending brackets **40**. The latter fit flatly against the outer face of the panel **7** in contact with the opposed edges of adjacent boards **22** and are fixedly secured in place by way of screws **41** which extend through holes in the brackets **40** into the panel **7**. The inner ends of the brackets **41** are welded to the ends of the tube **32**. The tube **33** is disposed directly above the tube **32** and is rotatively connected to the latter by way of the pivot sleeve **36**. The upper end of the pivot sleeve **36** fits within, and is connected by a drive fit to, the lower end of the tube **33** and the lower end of the pivot sleeve **36** fits loosely within the upper end of the tube **32**. The end regions of the tube **33** are provided with horizontally positioned radially extending brackets **42**. The latter fit flatly against the outer face of the panel **6** in contact with the opposed edges of the adjacent boards **22** and are secured in place by way of screws **43** which extend through holes in the brackets **42** into the panel **6**. The inner ends of the brackets **42** are welded to the ends of the tube **33**. The tube **34** of the hinge connection **8** is disposed directly above the tube **33** and is rotatively connected to the latter by way of the pivot sleeve **37**. The upper end of the pivot sleeve **37** fits within, and is connected by a drive fit to, the lower end of the tube **34** and the lower end of the pivot sleeve **37** fits loosely within the upper end of the tube **33**. The tube **34** is provided adjacent its lower end with a horizontally positioned radially extending bracket **44**. The latter fits flatly against the outer face of the panel **7** in contact with the upper edge of adjacent boards **22** and is fixedly secured in place by way of screws **45** which extend through holes in the bracket **44** and into the panel **7**. The inner end of the bracket **44** is welded to the tube

34 adjacent the lower end thereof. The tube and bracket arrangement of the hinge connection 8 is such that the panels 6 and 7 of the inside corner forming unit are hinged together so that they may be positioned relatively to one another at any desired angle between and including 90 and 180°. The confining arrangement of the various laterally extending brackets 38, 40, 42 and 44 with respect to the boards 22 as previously described, prevents relative vertical shifting of the hinge tubes and consequently of the panels in the assembled structure.

In order to maintain the hinge connection 8 in a permanently lubricated condition, the tubes 31, 32, 33 and 34 and the pivot sleeves 35, 36 and 37 are filled with a heavy or viscous lubricant 46 as shown in Figure 4. The lubricant is held within the tubes and pivot sleeves by way of a pair of plugs 47 and 48. The latter are preferably formed of cork or other resilient material. The plug 47 is driven into the lower end of the tube 31 and the plug 48 is driven into the upper end of the tube 34.

The angle bars 9 and 10 of the inside corner forming unit are respectively associated with, and connected to, the panels 6 and 7 and serve to prevent leakage or outflow of concrete past the hinge connection 8 in connection with use of the unit. They are preferably formed of steel and are the same in height as the two panels. The angle bar 9 consists of an inner leg 49 and an outer leg 50 at right angles to the inner leg. The inner leg 49 of the angle bar 9 fits flatly against, and is suitably fixedly secured to, the inner side edge of the panel 6. The outer leg 50 of the angle bar 9 is arranged in coplanar relation with the inner face of the panel 6, projects outwards at right angles to the inner side edge of such panel, and has its outer side edge in sliding engagement with the inner side portions of the outer surfaces of the tubes of the hinge connection 8. The other angle bar, i. e., the angle bar 10, consists of an inner leg 51 and an outer leg 52 at right angles to the inner leg. The inner leg 51 of the angle bar 10 fits flatly against, and is suitably fixedly secured to, the inner side edge of the panel 7. The outer leg 52 of the angle bar 10 is arranged in coplanar relation with the inner face of the panel 7, projects outwards at right angles to the inner side edge of such panel, and has its outer side edge in sliding engagement with the inner side portions of the outer surfaces of the tubes 31, 32, 33 and 34 of the hinge connection. The outer side edges of the outer legs 50 and 52 of the two angle bars are beveled (see Figure 2) so that they conform to the inner side portions of the outer surfaces of the tubes and hence do not result in grooves or irregularities in the inner corner portion of the bend in the concrete wall that is formed in connection with use of the unit.

When it is desired to use the inside corner forming unit, the unit is first manipulated into an upstanding position on a suitable foundation and then the panels 6 and 7 are swung relatively to one another into whatever angular position is desired. If the bend of the wall to be formed is to be a right angle bend the panels 6 and 7 are positioned so that they extend at a 90° angle as shown in Figure 3. After proper positioning of the unit the other parts of the form are manipulated into place as shown in Figure 1 and heretofore described. When the form as a whole is complete concrete in plastic or unset form is poured between the two series of edge to edge panels. After hardening of the concrete the clamping devices 18 are removed so as to release the various panels. After release of the panels the latter are removed and the projecting ends of the combined tie and spreader rods 17 are bent at right angles and then twisted so as to break the rods at the weakness points 27. In connection with removal of the inside corner forming unit it is contemplated that the panels 6 and 7 will be first swung towards one another so as to disengage them from the adjacent surfaces of the bend in the formed



concrete wall. It is also contemplated that the panels 6 and 7 after being swung towards one another will be shifted away from the wall so as fully to free the unit.

The herein described inside corner forming unit due to its particular design or construction effectively and efficiently fulfills its intended purpose and is characterized by the fact that it may be installed and removed with facility and also produced or fabricated at a comparatively low cost.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. As a new article of manufacture, an inside corner forming unit adapted to form a part of a concrete wall form and comprising a pair of side by side upstanding panels, a hinge connection operative to permit the panels to swing laterally and relatively to one another into different angular positions and embodying a vertical series of end to end tubes positioned between the inner side edges of the panels, provided with means between their adjoining ends whereby they are rotatably connected together, and having associated therewith horizontally positioned radially extending brackets certain of which are connected to certain of the tubes and fit against, and are secured to, the outer face of one of the panels and the others of which are connected to the other tubes and fit against, and are secured to, the outer face of the other panel, and a pair of upstanding bars associated with the inner adjacent opposed vertical side margins of the panels respectively, designed to prevent leakage of concrete past the hinge connection, and embodying longitudinally extending leg-like parts extending at right angles to and away from the inner side edges of the panels, arranged in substantially coplanar relation with the inner faces of the panels, and having their outer side edges in arcuate sliding engagement with the inner portions of the outer surfaces of the tubes, a viscous lubricant filling said vertical series of end-to-end tubes, and a sealing plug disposed in each of the uppermost and lowermost tubes respectively of the series.

2. As a new article of manufacture, an inside corner forming unit adapted to form a part of a concrete wall form and comprising a pair of side by side upstanding panels, a hinge connection operative to permit the panels to swing laterally and relatively to one another into different angular positions and embodying a vertical series of aligned coaxial abutting tubes positioned between the inner side edges of the panels, provided with internal pivot sleeves between their adjoining ends whereby they are rotatively connected together, and having associated therewith horizontally positioned radially extending brackets certain of which are connected to certain of the tubes and fit against, and are secured to, the outer face of one of the panels and the others of which are connected to the other tubes and fit against, and are secured to, the outer face of the other panel, and a pair of upstanding angle bars associated with the panels respectively, coextensive with the height thereof, designed to prevent leakage of concrete past the hinge connection, and consisting of inner legs fitting flatly against, and secured to, the inner side edges of the panels, and outer side legs extending at right angles to the inner legs and away from the panels, arranged in substantially coplanar relation with the inner faces of the panels, and having their outer side edges beveled and in sliding engagement with the inner portions of the outer surfaces of the tubes, said tubes and pivot sleeves of the hinge connections having a lubricant therein, and the uppermost and lowermost tubes being sealed at their outer ends against escape of lubricant therefrom.

3. As a new article of manufacture, an inside corner forming unit adapted to form a part of a concrete wall form and comprising a pair of side by side upstanding

wooden panels, a hinge connection operative to permit the panels to swing laterally and relatively to one another into different angular positions and embodying a vertical series of tubes arranged in aligned coaxial abutting relationship and positioned between the inner side edges of the panels, pivot sleeves telescopically received within the adjacent ends of said tubes for rotatably connecting the same together, a board having horizontal upper and lower edges secured to the outside face of each panel in the vicinity of tube juncture, a pair of radially extending brackets on each tube with the brackets of each pair being positioned adjacent the opposite ends of the tube respectively, one bracket of each pair underlying one of said boards in contact with the lower edge thereof and the other bracket of each pair overlying one of said boards in contact with the upper edge thereof, the brackets on certain alternately arranged tubes fitting against and being secured to one of said panels and the brackets on the other alternately arranged tubes fitting against and being secured to the other panel, a pair of upstanding angle bars designed to prevent leakage of concrete past the hinge connection, each angle bar having an inner leg



secured to the inner side edge of one of the panels and an outer side leg arranged in substantially coplanar relation with the inner face of the panel and in sliding engagement with the inner portions of the outer surfaces of the tubes, a lubricant disposed within the tubes and pivot sleeves of the hinge connections, and a sealing plug disposed in each of the uppermost and lowermost tubes respectively.

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