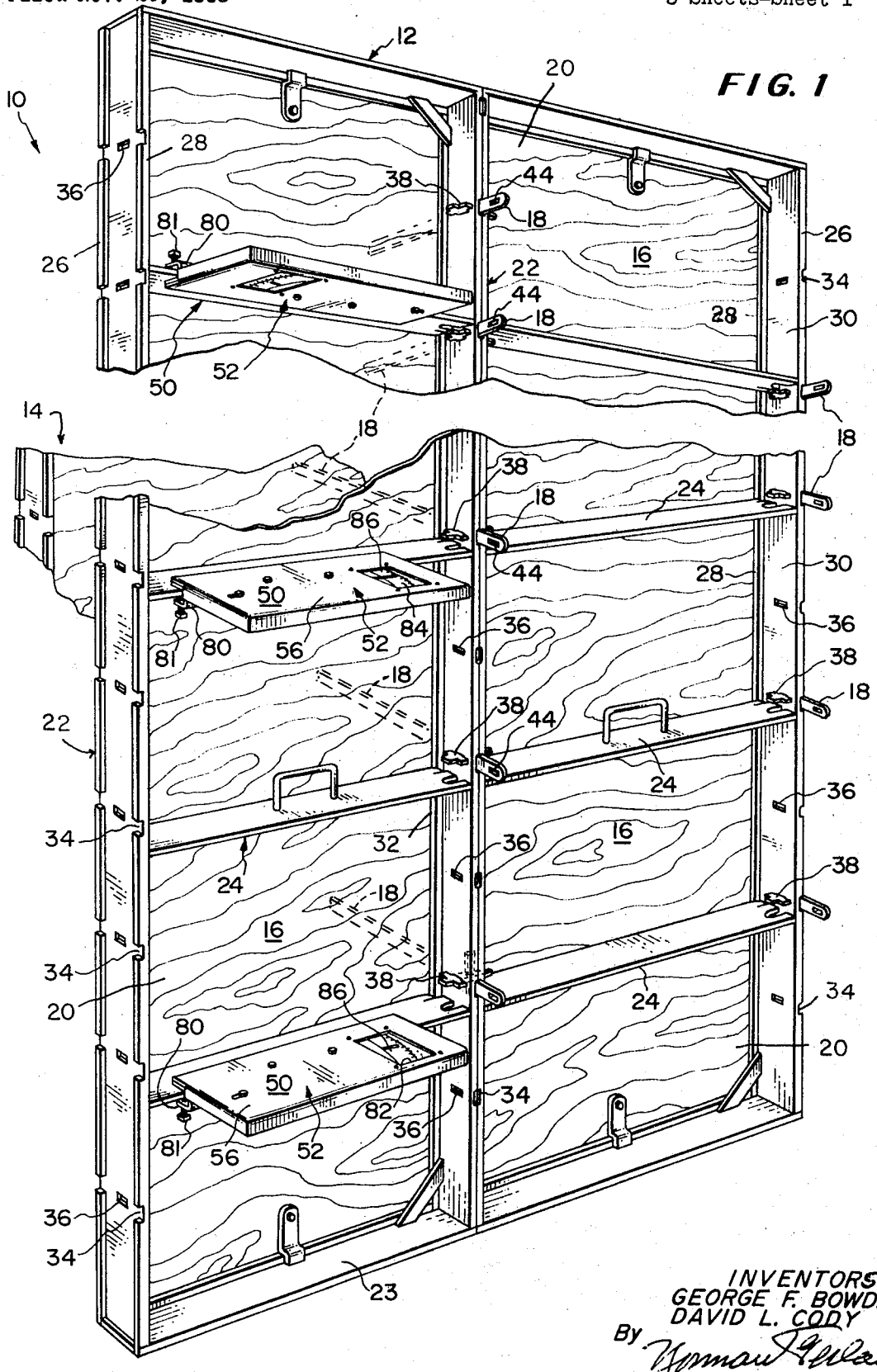
May 26, 1970 G. F. BOWDEN ET AL 3,513,803

TIE ROD LOAD INDICATOR

Filed Nov. 25, 1968 3 Sheets-Sheet 1

FIG. 1



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TIE ROD LOAD INDICATOR

Filed Nov. 25, 1968 3 Sheets-Sheet 2

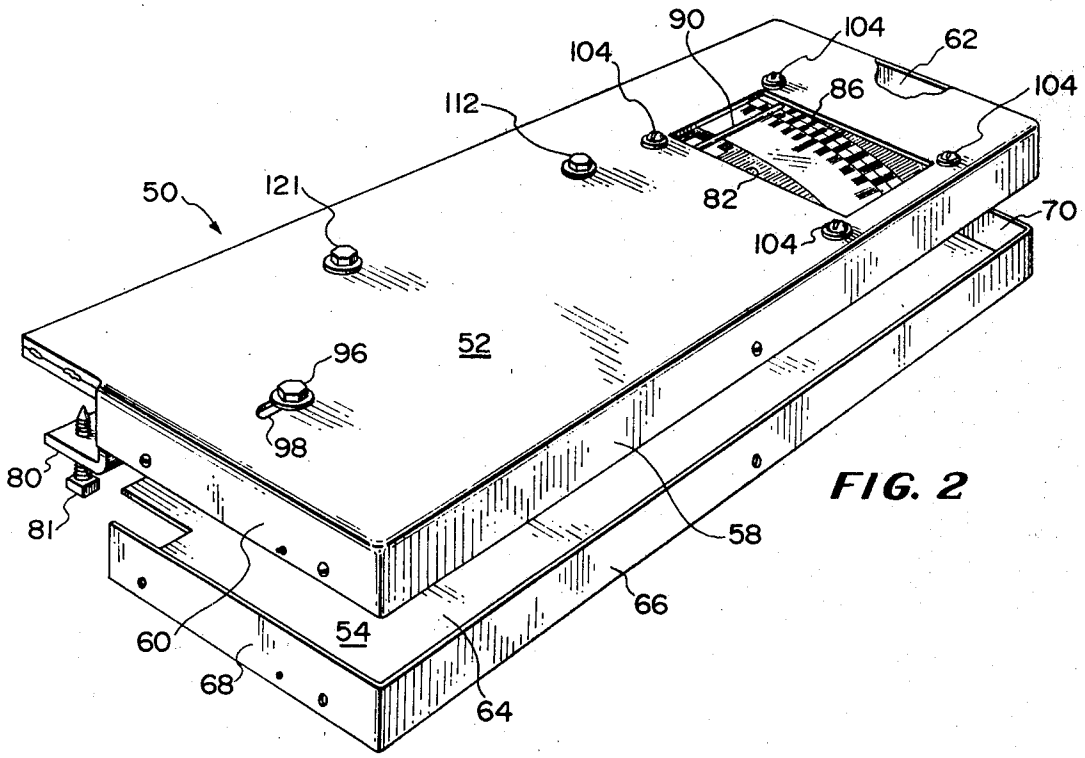


FIG. 2

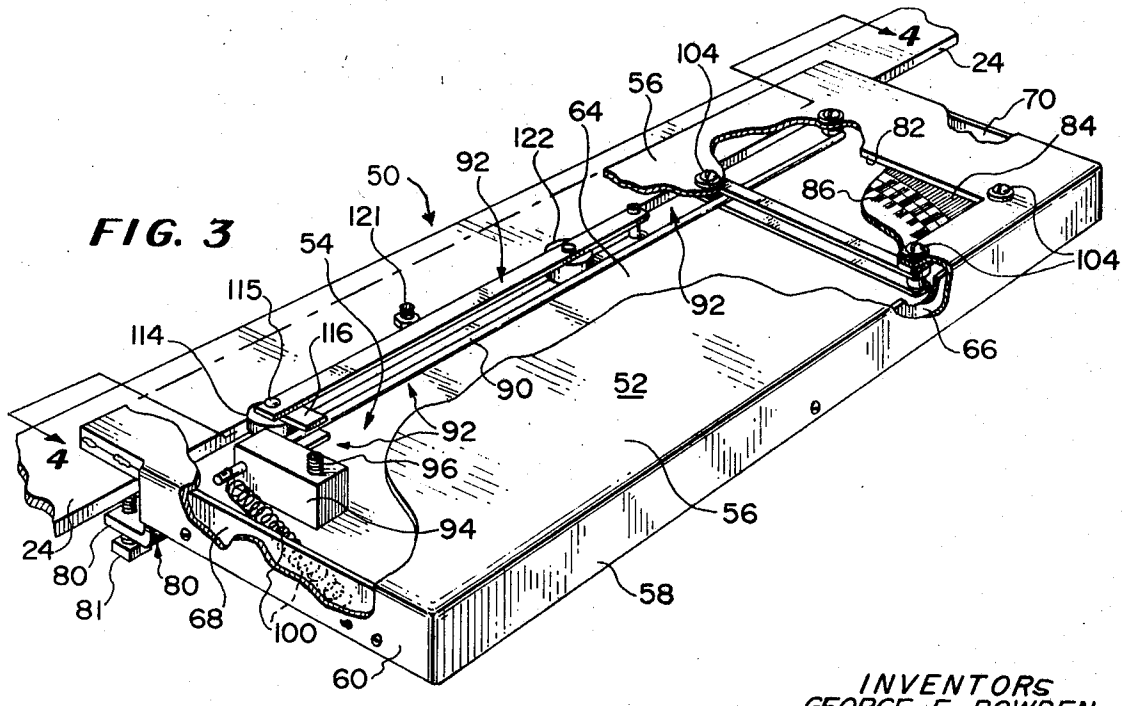


FIG. 3

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TIE ROD LOAD INDICATOR

Filed Nov. 25, 1968 3 Sheets-Sheet 3

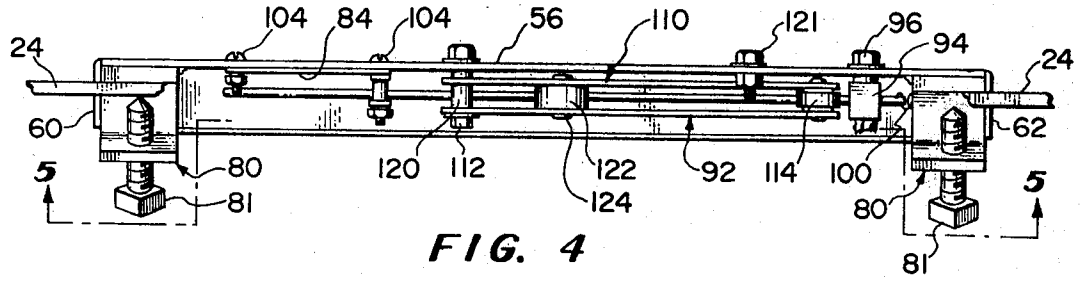


FIG. 4

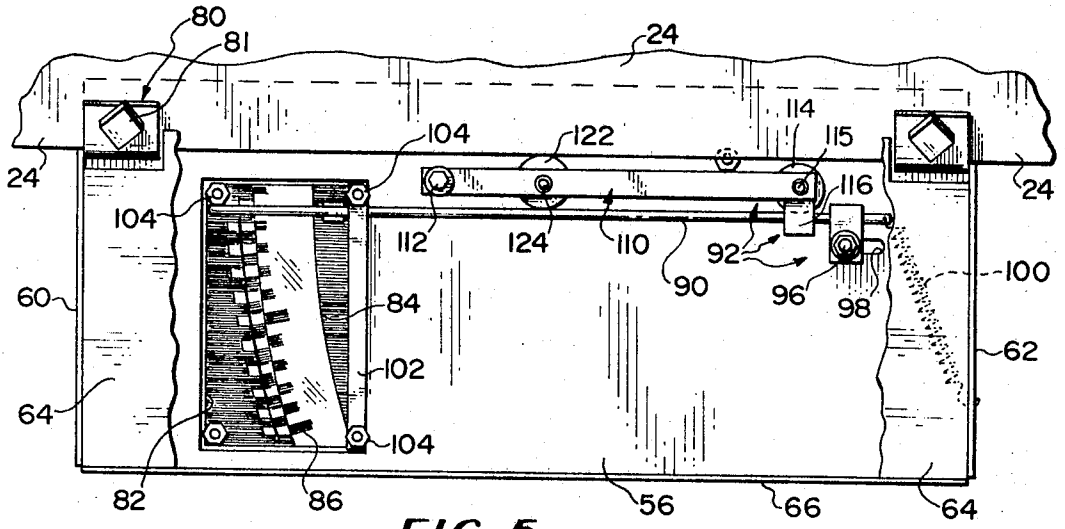


FIG. 5

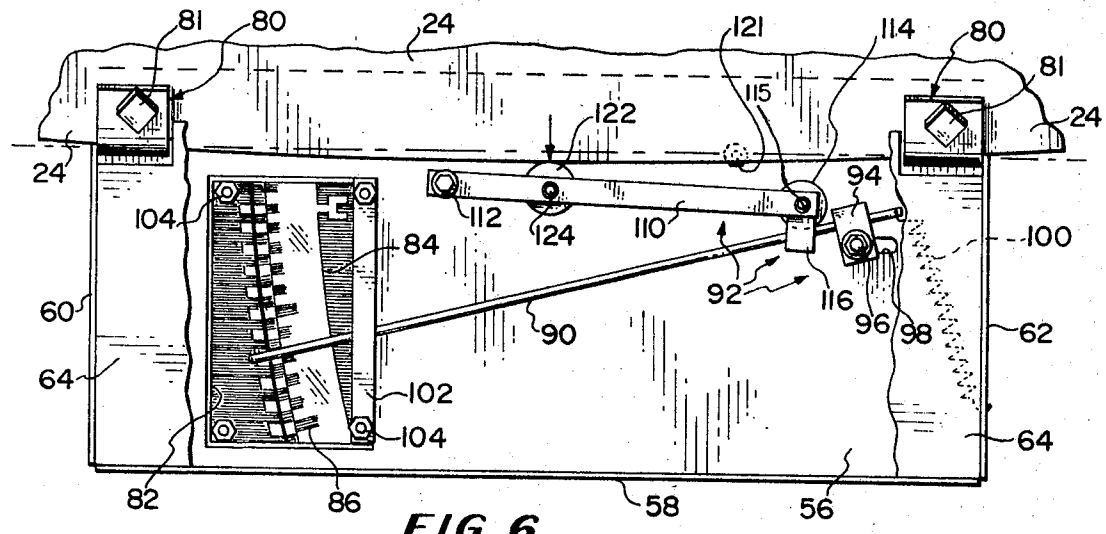


FIG. 6

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United States Patent Office 3,513,803 Patented May 26, 1970

3,513,803

TIE ROD LOAD INDICATOR

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Filed Nov. 25, 1968, Ser. No. 778,410
Int. Cl. G01d 21/00
U.S. Cl. 116—114 6 Claims

ABSTRACT OF THE DISCLOSURE

A tie rod load indicator which is designed for attachment to one of the crossbars of a wall form panel and measures the deflection of such crossbar under the influence of the pressure of the wet concrete which is poured against the facing of the panel, crossbar deflection being a direct function of the tension attained in the adjacent tie rods. A novel linkage mechanism magnifies the crossbar deflection and renders a visual indication of such deflection by means of a scale-and-pointer assembly which is visible through a window opening provided in a box-like housing which encloses the working parts of the indicator.

The present invention relates to a tie rod load indicator for measuring the deflection which takes place in the metal studding of a concrete wall form panel when the plywood or other facing of such panel is subjected to outward bulging under the tremendous thrust of the wet concrete which is poured against the panel during normal intended use of the latter. Specifically, the invention is concerned with a tie rod load indicator of the general type which is shown and described in copending U.S. patent application Ser. No. 539,112, filed on Mar. 11, 1966 and entitled "Tie Rod Load Indicator" (now U.S. Pat. No. 3,467,054, dated Sept. 16, 1969), and over which the present tie rod load indicator is an improvement.

In a concrete wall form installation, where a series of rectangular wall form panels are arranged in edge-to-edge relationship and also in opposed relation with a similar series of panels in order to form the spaced apart sides of the installation and to receive between it and the other series poured wet concrete for wall forming purposes, the horizontally and transversely extending tie rods which connect the two sides of the installation are subjected to extremely high tensional forces which progressively increase in proportion to a certain algebraic power of the height of the mass of the wet concrete as it is being poured. If concrete pouring operations are continued indiscriminately, rupture of the tie rods will, of course, take place. Therefore, it is current practice to calculate according to certain mathematical considerations the safe height to which one of successive batches of wet concrete may be poured for a given concrete wall installation, taking into consideration the safe height to which the wet concrete may be poured before the danger point is reached and it is hence necessary to discontinue pouring until the poured concrete has hardened sufficiently to justify a resumption of concrete pouring operations. These mathematical considerations involve such factors as the number and placement of the tie rods, the distance between the opposed and spaced apart sides of the concrete wall form installation, the fluidity of the wet concrete, the known rigidity of the panels, as well as other factors of a varied nature. By the successive pouring of superimposed "lifts" or batches of concrete to predetermined or calculated safe heights, danger of tie rod rupture may be effectively avoided.

The load indicator of the present invention makes possible a method of concrete pouring in connection with the erection of a concrete wall wherein the deflection of the metal studding of the wall form panels is correlated with the tie rod load and such deflection is measured so that each successive concrete pouring operation may be terminated at a given location or height in the installation when a predetermined amount of deflection representing the maximum safe tension or load on the tie rods has been attained.

The tie rod load indicator of the present invention finds particular use in connection with a concrete wall form installation which employ panels of the "Steel-Ply" type. A "Steel-Ply" panel consists essentially of a shallow tray-like structure including a rectangular plywood or other facing, the edges or marginal portions of which are completely encased in a metal rectangular reinforcing frame comprising transverse and longitudinal frame members, together with a normally vertical series of parallel spaced apart transverse crossbars which extend between the longitudinal frame members and lend reinforcement to the medial or central regions of the facing by constituting a backing therefor. Although the tie rods which extend between the two opposed and spaced apart sides of a concrete wall form installation are ordinarily connected to the sides at the juncture regions between adjacent panels so that the load on any given tie rod is a function of the tensional forces which are applied to the tie rod between such juncture regions, it is recognized that the localized deflection of the crossbars bears a predetermined relationship to the load which is applied to the tie rods in the vicinity of such crossbars. Therefore, if pouring operations are so conducted that the deflection of a given crossbar is maintained below a predetermined safe maximum deflection, the load upon the tie rods in the vicinity of such crossbar may be kept within safe limits. The present tie rod load indicator is in the form of a novel apparatus or device the design and use of which are predicated upon this principle of crossbar deflection measurement and consequent tie rod tension indication.

In carrying out the principles of the present invention, there is provided a novel tie rod load indicator which is in the form of a self-contained compact device or unit which is capable of being quickly attached to or removed from one of the crossbars of a concrete wall form panel of the "Steel-Ply" type and, when thus applied, progressively measures the deflection of such crossbar while the concrete is being poured against the plywood facing of the panel. A pointer and scale assembly in associated relation with, and forming a part of, the indicator gives a visual indication of the amount of deflection of the involved crossbar and certain markings on the scale are so calibrated as to indicate when a maximum safe tie rod tension or load has been attained so that an active concrete pouring operation in the vicinity of the crossbar to which the indicator is applied may be terminated. More specifically, the tie rod load indicator of the present invention comprises a rigid shallow tray-like housing or rectangular configuration, one wall of which constitutes a reaction plate which carries at adjacent corners thereof a pair of clamps by means of which the plate may be secured at widely spaced points to the medial region of a crossbar in edge-to-edge relationship with the plate lying generally in the horizontal plane of the crossbar and in overhanging relationship. A spring-biased pointer, having its proximate end pivoted to the plate for swinging movement across the general horizontal plane thereof, has its distal end visible through an opening or window in the plate, the pointer cooperating visually with a scale which traverses the window and may be stencilled, printed, or in the form of a decalcomania, on the transparent window pane. The proximate region of the pointer is designed for sliding contact with

the distal end of a beam-engaging lever, the proximate end of such lever being pivoted to the plate and the lever making effective contact with the central portion of the crossbar under the influence of concrete pressure against the associated plywood facing is greatly magnified by corresponding swinging movements of the lever and the pointer and the position of the latter with respect to the window-covered scale may readily be visualized. The aforementioned plate which serves as a mount for the two crossbar-engaging clamps, the pointer and the lever, constitutes one major, mechanism-supporting side of the generally flat shallow rectangular tray-like housing, the other major side of the housing being in the form of a removable cover plate which conceals the working mechanism of the indicator and, in combination with the mechanism-supporting plate, encloses and protects the operative moving parts of the indicator.

The present tie rod load indicator is capable of being clamped to a given crossbar in its normal horizontal position with the window-carrying plate facing either upwordly or downwardly as desired. When applied to a crossbar which lies below the eyes of an observer, i.e., within four or five feet from the ground level, the indicator will be clamped to the crossbar with the window opening facing upwardly so that the pointer may readily be viewed from above. If the crossbar is disposed at a level which lies above the eyes of the observer, the position of the indicator will be reversed so that the window faces downwardly for viewing from below. In either situation, the operation of the indicator is not altered. Finally, means are provided whereby the pivot point for the pointer may be varied or adjusted within small limits to re-adjust the movements of the pointer so that they will conform to the calibration of the scale if for any reason the original factory-adjustment is disturbed.

The provision of a tie rod load indicator such as has been briefly outlined above and possessing the stated advantages constitutes the principal object of the present invention.

Numerous other objects and advantages, not at this time enumerated, will readily become apparent as the nature of the invention is better understood from a consideration of the following detailed description.

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

In the accompanying three sheets of drawings forming a part of this specification, one illustrative embodiment of the invention is shown, together with a disclosure of the manner in which it is employed in connection with a concrete pouring operation.

In these drawings:

FIG. 1 is a fragmentary perspective view of a portion of a conventional concrete wall form installation, illustrating the manner in which the present tie rod load indicator is attached to one of the crossbars of one of the wall form panels of the installation;

FIG. 2 is an exploded top perspective view of the tie rod load indicator;

FIG. 3 is a top perspective view showing the assembled tie rod load indicator operatively applied to a panel crossbar, portions of the indicator housing being broken away in the interests of clarity;

FIG. 4 is a horizontal sectional view taken on the horizontal plane represented by the line 4—4 of FIG. 3 and in the direction of the arrows;

FIG. 5 is a sectional view taken substantially on the line 5—5 of FIG. 4; and

FIG. 6 is a sectional view similar to FIG. 5 but showing the condition of the indicator when the crossbar to which it is attached is under an appreciable concrete load due to the pouring of concrete against the adjacent plywood facing.

Referring now to the drawings in detail and in particular to FIG. 1, a conventional concrete wall form in-

stallation is designated in its entirety by the reference numeral **10** and involves in its general organization two series **12** and **14** of rectangular concrete wall form panels **16**, the panels of each series being arranged in upstanding and edge-to-edge relationship and forming one side of the installation. The panels **16** of the two series are maintained in spaced parallel relation by means of horizontal, transversely extending tie rods **18**, two such tie rods being illustrated as being associated with two adjacent panels of each series in the production of the concrete wall which is to be formed by pouring of wet concrete between the two sides of the installation **10**.

The various panels **16** are of the prefabricated "Steel-Ply" type, which is to say that they consist of rectangular plywood facings **20** and rectangular steel studding or reinforcing frames around the edges of the facings **20**. The reinforcing frame of each panel **16** consists of vertical frame members **22** and horizontal frame members **23**. At appropriate levels in the concrete form installation, suitable crossbars **24** of angle shape design extend across the outer faces of the panel facings **20** and between the vertical frame members **22**.

Specifically, the vertical frame members **22** are in the form of structural steel bars which are generally of shallow U-shape cross section and include spaced marginal parallel ribs **26** and **28** and connecting web portions **30**. Such ribs extend outwards from the web portions **30**. On the side of each web portion **30**, that is, opposite to the ribs **26** and **28**, is a shallow longitudinally extending rib **32** which projects inwards and defines an annular groove or recess for reception therein of the adjacent vertical edge region of the associated plywood facing **20**. The horizontal crossbars **24** have the ends thereof welded or otherwise fixedly connected to the inside faces of the web portions **30** of the vertical frame members **22**. At vertically spaced regions along the vertical frame members **22**, the ribs **26** and **28** are provided with notches **34** to accommodate the end portions of the tie rods **18**, while the web portions **30** of the vertical frame members **22** are formed with rectangular slots **36**. These slots are in horizontal register with the notches **34** and are adapted for reception therethrough of the bolts of conventional connecting bolt and wedge assemblies **38** by means of which adjacent wall form panels are fastened together, all in a manner that is well known in the concrete wall construction art.

The tie rods **18** are each in the form of a length of flat sheet metal stock of rectangular cross section and of a longitudinal extent appreciably greater than the over-all width of the spaced series **12** and **14** of panels **16**. Spaced apart slots **44** are formed in the end portions of the tie rods **18** for selective register with the slots **36** in the web portions **30** of the vertical frame members **22** when the concrete wall form installation is assembled, to the end that the bolts of the bolt and wedge assemblies **38** may cooperate with the slots **36** and **44** in securing the end portions of the tie rods **18** in position between adjacent panels **16**.

It will be apparent that when wet concrete is poured between the two spaced apart sides of the concrete wall form installation **10**, that is, the series **12** and **14** of connected panels **16**, the horizontally disposed tie rods **18** will be placed under tension and that the pouring of each "lift" or batch of wet concrete must be terminated in a given region of the installation before the maximum safe load on the tie rods in the vicinity of pouring operations is exceeded. When wet concrete is poured between the two series **12** and **14** of panels, not only does outward bulging take place due to the lateral forces which are applied to the form installation at the juncture regions between adjacent panels, but bulging of the plywood facings of the individual panels takes place and is restrained by the existence of the crossbars **24**. As a consequence, these crossbars are subject to lateral outward deflection or bending. Therefore, the amount of lateral deflection

which takes place in any given crossbar **24** is a fairly accurate measure of the tension which has been attained in the adjacent tie rods **18**, this tension depending of course, upon the number of employed tie rods, the greater the number of tie rods, the greater the load which these tie rods, considered collectively, will withstand. In order to measure the deflection of a given crossbar **24**, there is provided, according to the present invention, a novel tie rod load indicator **50** which is capable of being quickly and easily applied to and removed from a selected crossbar **24**.

Referring now additionally to FIGS. 2 to 6, inclusive, the tie rod load indicator **50** of the present invention involves in its general organization a two-part flat rectangular housing of comparatively small thickness and comprising two separable parts, namely, a base part **52** and a cover part **54**. In the position in which the indicator **50** is shown in FIGS. 2, 3 and 4, the base part is the upper part while the cover part is the lower part which fits within the upper part in telescopic relationship. Considering the base part **52** in its thus illustrated position, it is in the form of a rectangular plate **56** having three downturned marginal flanges including a longitudinally extending side flange **58** which extends along the outer longitudinal edge of the plate, and opposed end flanges **60** and **62** which extend along the transverse end edges of the plate **56**. The plate **56** constitutes the top wall of the base part **52** of the indicator housing and it serves operatively to support all of the operating parts of the tie rod load indicator **50**.

The cover part **54** also is in the form of a rectangular plate **64** (see particularly FIG. 2) having three upturned marginal flanges including a longitudinally extending side flange **66** and two opposed end flanges **68** and **70**. The three flanges **66**, **68** and **70** fit within the three flanges **58**, **60** and **62** of the base part **52** as shown in FIG. 3, the two plates **56** and **64** remaining spaced apart a slight distance so that the thus assembled housing is of flat rectangular design and presents one open side, i.e., the side opposite the side which is defined by the side flanges **58** and **66**. It is to be noted that the cover part **54** which, as aforementioned, is telescopically received within the confines of the base part **52**, does not support or cooperate in any manner with the various movable deflection-measuring instrumentalities which are entirely supported from the base part **52**. The function of the cover part **54** is solely to enclose these instrumentalities and shield them, both when the indicator **50** is in use, and during handling, shipment, or storage thereof.

As shown in each of FIGS. 2 to 6, inclusive, two flange clamps **80** of C-shape configuration and having clamping screws **81** associated therewith are disposed adjacent to the two corners of the plate **56** which are disposed near the open side of the housing, and are adapted to be fixedly secured to the end regions of a selected crossbar **24** as shown in FIGS. 1, 4, 5 and 6, preferably with the flange clamps presenting an equal spacing with respect to the adjacent vertical frame members **22** of the associated panel **16**. For reasons that will be made clear presently, such attachment of the flange clamps **80** to a given crossbar in a concrete wall form installation such as is illustrated in FIG. 1 may be made with the tie rod load indicator as a whole assuming a horizontal position with either the base part **52** or the cover part **54** facing upwardly. The upper leg portions of the flange clamps **80** are preferably welded to the adjacent corner portions of the plate **56** of the base housing part **52**.

Considering again the construction of the base part **52**, the rectangular plate **56** of such part is provided with a rectangular window opening **82** in the right-hand region thereof as viewed in FIGS. 2 and 3 and in the left-hand region thereof as viewed in FIGS. 5 and 6. A glass or other transparent pane **84** extends across the window opening and has applied thereon a scale **86** which may

be calibrated in any desired manner with suitable indicia having reference to the amount of cross bar deflection which takes place during concrete-pouring operation. The scale **86** is designed for cooperation with a pointer **90**. The latter has associated with it a magnification linkage mechanism which is designated in its entirety by the reference numeral **92** in FIGS. 3 to 6, inclusive, and is supported solely from the plate **56** of the housing base part **52**.

The pointer **90** is in the form of an elongated rod, the proximate end region of which projects completely through at laterally adjustable pivot block **94** and is fixedly secured in the block by soldering, brazing or the like. The block **94** is loosely mounted for angular turning movement in a horizontal plane about the axis of a shouldered pivot pin **96** which is capable of being clamped in selected adjusted positions along a slot **98** in the plate **56**. The extreme proximate end of the pointer **90** is suitably attached to one end of a helical tension spring **100** and the other end of the spring is secured to the downturned end flange **62** on the plate **56** at a point where the tension in the spring will yieldingly urge the pointer **90** in a counterclockwise direction as viewed in FIGS. 2 and 3 and in a clockwise direction as viewed in FIGS. 5 and 6. The distal end region of the pointer **90** is guided between a bar-like strap **102** and the plate **56**, while the extreme distal end of the pointer traverses the scale **86**. A series of four nut and bolt assemblies **104** serves to hold the transparent pane **84** in position over the window opening **82** and two of these assemblies also serve to hold the strap **102** in spaced position on the underneath or bottom side of the plate **56** of the base housing part **52**.

The linkage mechanism **92** further includes thrust means in the form of a second class lever **110**, the proximate end of which is pivoted by a vertical pin **112** to the plate **56** for horizontal swinging movement in the same general plane as that of the pointer **90** and the distal end of this lever carries a cam member **114** which is preferably in the form of a roller which is received on a pins **115** and rides against the pointer **90** in the proximate regions thereof and in the vicinity of the adjustable pivot block **94**. Two guide flanges **116** straddle the pointer **90** near said block and are carried at the distal end of the lever **110**. As shown in FIG. 4, the lever **110** is of the dual link type and is comprised of two parallel, horizontally extending links **118** which are maintained in their spaced parallel relationship by a spacer sleeve **120** around the pivot pin **112**. The retracted position of the lever is determined by a limit stop **121** which is mounted on the plate **56** and against which the lever normally bears.

A second cam member **122**, which likewise may be in the form of a roller, is mounted on a vertical pin **124** on the lever **110** and assumes a medial region with respect to the latter, this second cam member assuming a position relatively close to the pivot pin **112** and relatively remote from the cam member **114**. The cam member **122** is designed for direct engagement with the central region of the crossbar **24** to which the tie rod load indicator is attached.

Although, if desired, the two roller- type cam members **114** and **122** may be loosely mounted on their respective supporting pins so that they are capable of free rotation thereon. In the illustrated form of the invention, the two pins are in the form of rivets which fixedly clamp the cam members against rotation so that they make sliding contact with the pointer and the crossbar respectively rather than tractional rolling contact.

Referring again to FIG. 1, when the tie rod load indicator **50** of the present invention is to be employed for measuring the deflection in a given crossbar **24**, application to the crossbar may be made in either of two positions. If the crossbar is positioned in the concrete wall

form installation **10** at a low elevation where it lies below the level of the eyes of an observer, the indicator will be attached to the crossbar in the manner previously described with the base part **52** facing upwardly so that the window opening **82** and the scale **86** may readily be viewed by the observer. On the other hand, if the crossbar is disposed above the level of the eyes of an observer, the indicator **50** will be attached to the crossbar with the base part **52** facing downwardly where, by looking upwardly, the scale and pointer mechanism may be conveniently seen. In either position of the indicator **50**, the roller **122** (FIGS. 5 and 6) will engage the central region of the crossbar for proper magnification by the mechanism **92** of the deflection of the crossbar when the wet concrete is poured between the opposite sides of the wall form installation.

The present tie rod load indicator makes possible a time-saving method of pouring wet concrete into a concrete wall form installation having "Steel-Ply" or other panels employing crossbars or other transverse members which are subject to outward deflection or bending incident to outward bulging of the panel facings under the influence of concrete pressure during pouring operations. Assuming that the concrete wall form installation **10** of FIG. 1 is of great length, pouring operations may be commenced in the vicinity of the right hand tier of panels **16**. The concrete is poured between the two panel series **12** and **14** of the installation and the wet concrete falls on the foundation surface between the two panel series **12** and **14** and commences to build up between the two sides of the installation. The lowermost crossbar **24** to which one of the tie rod load indicators **50** is applied will become outwardly deflected progressively as the pressure of concrete on the associated panel facing **20** increases. It will be understood, of course, that such deflection of the selected crossbar will be a direct function of the tension to which the tie rods **18** in the vicinity of such crossbar are subjected. Thus, outward deflection or bending of the lowermost crossbar occurs as the concrete is poured and causes the pointer **90** to traverse the window opening **82** and move progressively along the scale **86**. The observer, by watching the movement of the pointer, may thus ascertain when the maximum safe pouring level has been attained and terminate concrete pouring operations at that time in the particular involved region. Such pouring operations may, however, be carried out in other and remote regions of the concrete wall form installation **10**. In a short period of time, usually the time that is consumed by these remote pouring operations, the initially poured concrete will have settled and set or hardened to such an extent that the concrete is then ready to bear an additional load or batch of wet concrete. When this occurs, pouring operations may again be resumed in the vicinity of the first pouring operation and such concrete as may be piled upon the originally poured concrete will have no further effect on the pointer **90** of the lowermost tie rod load indicator **50** since the concrete in the vicinity of this apparatus will have hardened. During the second pouring operation in this particular region of the installation, the next higher tie rod load indicator **50** above the first indicator will then be watched for crossbar deflection and pouring operations again terminated when this second indicator renders an indication that the maximum safe load on the various adjacent tie rods has been attained. Pouring operations may then again be transferred to other remote regions of the installation, returning to the able with said lever for maintaining the latter within of the plate, and a limit stop on said plate and engage- pointer in a direction toward said one longitudinal edge indicator **50** for the indication of a safe pouring limit for cluding, additionally, a pair of guide flanges carried by said lever adjacent to the distal end thereof and straddling region of the lever has mounted thereon a second cam said pointer for maintaining the pointer and lever in colplanar register with each other.

the progression of the wall undergoing erection. Thus, a large inventory of the indicators **50** is not required at the site of any given concrete wall form installation.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention.

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

1. For use in a concrete wall form installation having a wall form panel embodying a panel facing and a crossbar extending horizontally across one side of the facing and serving to reinforce said facing, a load indicator adapted to indicate the deflection of said crossbar under the influence of the pressure of wet concrete bearing against the other side of said facing, said load indicator comprising a rectangular base plate having inner and outer longitudinal edges and interconnecting transverse end edges, said outer longitudinal edge and said transverse end edges being provided with downturned marginal flanges, thus establishing a shallow tray-like base part, means for releasably clamping the opposite ends of one longitudinal edge of said plate to the end regions of said crossbar so that the plate is positioned alongside the crossbar and lies approximately in the horizontal plane thereof, a pointer having its proximate end pivoted to said plate at one end region of the latter for swinging movement of the pointer in a horizontal plane across one face of the plate and within said shallow tray-like base part, and having its distal end disposed in traversing relationship with respect to the other end region of the plate, a scale mounted on said plate and in effective register with said distal end of the pointer for visual indication of the position of the pointer, thrust means carried by said plate within said tray-like base part for displacing said pointer throughout an angle commensurate with the amount of lateral displacement to which the central region of the crossbar is subjected when deflection of the crossbar takes place, said thrust means comprising a lever having its proximate end pivoted to said plate for swinging movement in substantially the same horizontal plane as the plane of swinging movement of the pointer and having its distal end engageable with the proximate and region of the pointer, a medial region of the lever being slidingly engageable with the central region of the crossbar, and a removable cover part consisting of a rectangular cover plate with relatively narrow marginal upturned flanges thereon which are telescopically received within the confines of the flanges on the base plate, said base part and cover part thus establishing a generally flat rectangular box-like housing within which the pointer and thrust means are disposed.

2. A load indicator as set forth in claim **1** and wherein said other end region of the plate is provided with a window opening therein and a transparent pane extending across said opening, and said scale is disposed on said pane and is thus visible through the window opening and pane.

3. A load indicator as set forth in claim **1** and wherein the distal end of said lever has mounted thereon a first cam roller engageable with the pointer and the medial roller engageable with the central region of the crossbar.

4. A load indicator as set forth in claim **3** and including, additionally, spring means yieldingly urging said ing operations are repetitious, there being one tie rod load

5. A load indicator as set forth in claim **4** and in- of concrete has become settled and hardened. Such pour- original pouring region only when the second lift or batch the rectangular confines of the plate.

The tie rod load indicator **50** constituting the present invention is capable of easy removal from its installed position on the associated crossbar so that they may be repositioned on the form installation repeatedly during each concrete lift or batch.

6. A load indicator as set forth in claim 3 and including, additionally, a guide strap secured to said plate, extending transversely thereof and across said other end region of the plate, said guide strap, in combination with the adjacent face of the plate, defining a guide slot through which the distal end region of the pointer projects for guiding the pointer in its horizontal plane of swinging movement.

References Cited

UNITED STATES PATENTS

1,306,891	6/1919	Grafton	73—144
1,591,631	7/1926	Kennedy et al.	73—144
1,817,203	8/1931	Payne	73—144
2,618,153	11/1952	McKernan	73—144
2,743,607	5/1956	Decker	73—144
3,174,334	3/1965	McKernan	73—144

FOREIGN PATENTS

1,073,362	6/1967	Great Britain.

LOUIS J. CAPOZI, Primary Examiner

U.S. Cl. X.R.

73—144; 116—124

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,513,803 May 26, 1970

George F. Bowden et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 67, beginning with "able with said" cancel all to and including "wall form installation." in line 3, of column 8, and insert

> original pouring region only when the second lift or batch of concrete has become settled and hardened. Such pouring operations are repetitious, there being one tie rod load indicator 50 for the indication of a safe pouring limit for each concrete lift or batch.
>
> The tie rod load indicator 50 constituting the present invention is capable of easy removal from its installed position on the associated crossbar so that it may be repositioned on the form installation repeatedly during the progression of the wall undergoing erection. Thus, a large inventory of the indicators 50 is not required at the site of any given concrete wall form installation.

Column 8, line 45, "and" should read -- end --; line 62, after "medial" insert -- region of the lever has mounted thereon a second cam --; same column 8, cancel lines 71 to 75, inclusive.

Signed and sealed this 16th day of February 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents