Dec. 1, 1959 C. N. LUNDGREN 2,914,816

SUSPENSION BRIDGING STRUCTURE

Filed Aug. 6, 1958

Fig. 1

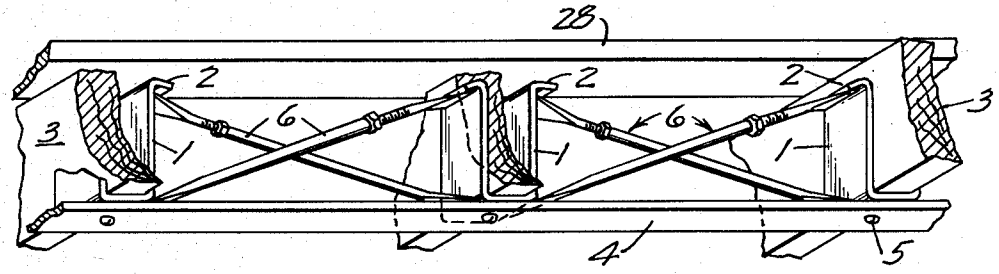


Fig. 2

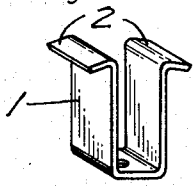


Fig. 3

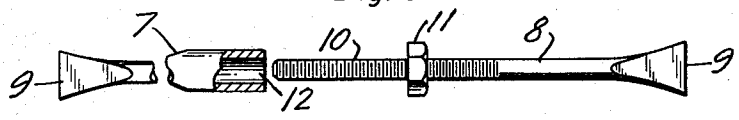


Fig. 4

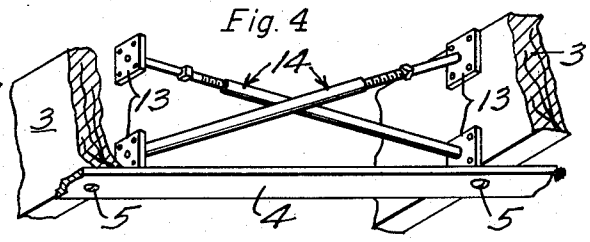


Fig. 5

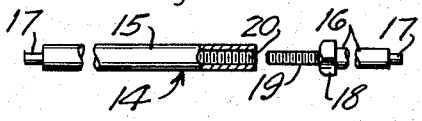


Fig. 6

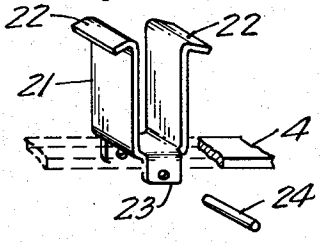


Fig. 7

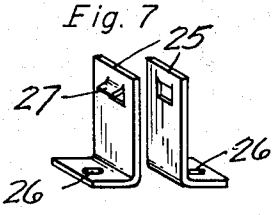
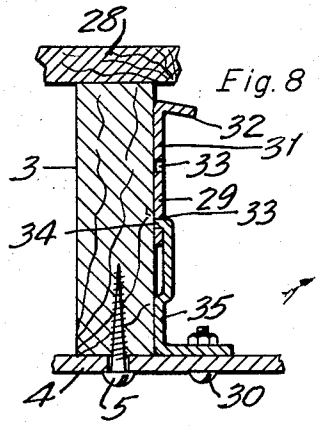


Fig. 8



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SUSPENSION BRIDGING STRUCTURE

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9 Claims. (Cl. 20—9)

This invention relates to a supporting structure for buildings, and in particular to a suspension bridging or bracing for supporting floor and ceiling joists, roof rafters, studding and the like which frequently sag or bow when subjected to heavy loads.

An important object of my invention is a supporting structure which will prevent such sagging and bulging in new buildings and which will correct any such existing defects in older buildings.

Since it is desirable to have a clear span beneath such construction, another object is a structure which is self-supporting and avoids the use of unsightly and inconvenient posts and stringers.

A still further object is a supporting structure which is adaptable to joists, rafters and studding which are irregularly spaced or of non-uniform depth. Throughout the description of my invention, floor and ceiling joists, roof rafters, studding and the like will be included in the term "joist." The cross bracing referred to throughout the description refers to individual bracing members which extend between the joists, and does not necessarily imply the cross bracing arrangement of a pair of bracing members as shown in Figures 1 and 2, although such an arrangement is one of the preferred forms of my invention.

The suspension supporting structure of my invention broadly comprises a supporting beam or plate, bracing extending diagonally between adjacent joists, and a fixed clamp or bracket members for engaging the bracing elements in thrust relationship to the adjacent joists.

Figs. 1 and 4 are perspective views of two forms of my invention in assembled relationship to a building structure;

Figs. 2, 6 and 7 illustrate different types of clamps or brackets which may be used in the invention;

Figs. 3 and 5 illustrate two forms of cross bracing which may be used in the invention; and

Fig. 8 is a front elevational vertical cross sectional view of still another type of bracket in attached relationship to a building structure.

Referring to Fig. 1, clamp 1, a U-shaped member having flanges 2 is fitted over the lower or exterior edge of each of the joists 3. A supporting plate or beam 4 which is fixedly secured and supported at its extremities either by lying on the foundation or by fixed attachment to the outermost joists passes beneath the joists 3 in transverse relation thereto and is attached to said joist by means of wood screw 5. Longitudinally adjustable cross bracing members indicated generally by 6 extend diagonally between each pair of adjacent joists and are rigidly secured in thrust relationship thereto, one end of each of said cross bracing members being inserted into the angle formed by flange 2 and the main body portion of clamp 1, the other end of each of said cross bracing members being inserted into the angle formed by the juncture of clamp 1 with supporting plate 4. The entire structure including the joists supports flooring 28. Clamp 1 is also shown in Fig. 2 and adjustable cross

bracing members 6 are shown in detail in Fig. 3. The cross bracing members 6 shown in Figs. 1 and 3 consist of mating members 7 and 8, each of said members having a flat tapered end portion 9. The main body of member 7 is of tubular construction and receives the threaded portion 10 of member 8. Longitudinal movement of the bracing member 6 is prevented and a rigid unit is formed by turning nut 11, which is threadedly attached to threaded portion 10, until nut 11 makes contact with shoulder 12.

Referring to Fig. 4 which shows another form of my invention in assembled relationship, supporting plate 4 again traverses the joists 3 and is secured thereto by means of screw 5. Plates 13 having an opening in the central portion thereof are fixedly attached to joists 3. Longitudinally adjustable cross bracing members indicated generally by 14 and shown in detail in Fig. 5 extend diagonally between each pair of adjacent joists 3 and are thrust connected thereto. Cross bracing members 14 consist of mating components 15 and 16, each component having a projecting pin 17 at one end thereof for insertion into the central opening of plate 13. Component 16 including turning nut 18 is of integral structure and in use threaded portion 19 is inserted into threaded interior diameter 20 where the threaded portions mate to form a rigid cross bracing unit. Pins 17 are inserted into the central openings of plates 13 and secured thereto by longitudinally extending cross bracing 14 until a secured rigid relationship is established.

Fig. 6 shows a different form of clamp indicated generally by 21 which may be substituted for clamp 2 in the supporting structure shown in Fig. 1. Clamp 21 has projecting flanges 22 similar to the projecting flanges 2 of clamp 1 and in addition has downwardly projecting flanges 23 with openings therein for receiving pin 24. Supporting plate 4 passes beneath clamp 2 and is secured thereto by means of pin 24 which passes through the openings of flanges 23 and beneath supporting plate 4 and rests on the downwardly projecting flanges 23.

Fig. 7 shows a pair of brackets indicated generally by 25 which also may be substituted for clamp 1 in the structure shown in Fig. 1. A bracket is attached to both sides of every joist, the vertical portion of each bracket resting against the side of each joist. The brackets are secured to supporting plate 4 by any conventional nut and bolt arrangement passing through openings 26. Projecting ear 27 serves the same purpose as projecting flanges 2 of clamp 1 and projecting flanges 22 of clamp 21 and receives and secures end portion 9 of the cross bracing members 6.

Fig. 8 shows a vertically adustable bracket indicated generally by 29 which also may be substituted for clamp 1 in the supporting structure shown in Fig. 1. Bracket 29 is secured to supporting plate 4 by a nut and bolt combination indicated generally by 30. Bracket 29 consists of upper member 31 having projecting flange 32 for receiving one end of each cross bracing member 6 and openings 33 for receiving the inwardly projecting lip 34 of lower member 35. By being vertically adjustable, bracket 29 may be adapted to joists of varying depths.

The number of cross bracing members between each pair of adjacent joists may be more or less than that shown in my preferred structures as shown in Figs. 1 and 4. If only one cross bracing member is used between each pair of joists they must be substantially parallel to one another in the vertical plane so that each joist has at least one bracing member providing an upward thrust against it. Each cross bracing member must be disposed at a substantial angle from the horizontal plane which is parallel to the length of the joist, the greater the angle the stronger the supporting structure

will be. The cross bracing and clamps may also vary in their particular design. However, the cross bracing must be longitudinally adjustable and capable of becoming a rigid member and the clamps or brackets must be capable of receiving and securing the cross bracing in thrust relationship. The lower ends of the cross bracing providing a downward thrust may be affixed either to the joist by means of a clamp or bracket or it may be inserted into the point between the clamp or bracket and the supporting beam or it may be affixed directly to the supporting beam by a convenient means such as an upwardly projecting flange on the beam itself.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention which consists of the matter shown and described herein and set forth in the appended claims.

What I claim is:

1. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, roof rafters, and studding having in combination, a substantially rigid beam element fixedly secured and supported at its ends and extending transversely and in close relation to the exterior edges of said longitudinal structural members, means for connecting said beam element with each of said longitudinal elements, plate structure attached to each of said longitudinal structural members and in contact with the sides of said longitudinal members and a series of cross bracing and stressing units, a unit being disposed between and attached to each pair of adjacent longitudinal elements, each unit comprising at least one longitudinally adjustable bracing member, one end of said bracing member being thrust-connected to said plate structure at a point substantially removed from the exterior edge of said longitudinal structural member and the other end of said bracing member being thrust-connected with said plate structure and with said beam at an area adjacent the contiguous relation of said beam and longitudinal element.

2. A suspension bridging structure for interconnecting and applying supporting stress to a series of spaced substantially parallel longitudinal structural members such as joists, roof rafters and studding comprising a substantially rigid beam element fixedly secured and supported at its ends and extending transversely to the exterior edges of said longitudinal elements and secured thereto, a U-shaped clamp attached to each of said longitudinal members and interposed between the exterior edge of said longitudinal members and said rigid beam element and a series of longitudinally adjustable cross bracing and stressing units, at least one of said units being diagonally disposed between each pair of adjacent longitudinal members and in contact with the clamp of each of said pair of longitudinal members so as to create a stressed relationship between the bracing member and the adjacent longitudinal members.

3. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination, a substantially rigid beam element fixedly secured and supported at its end and extending transversely and in close relation to the exterior edges of said longitudinal structural members, means for connecting said beam element with each of said longitudinal members, at least one longitudinally adjustable cross bracing and stressing unit disposed in stressed relationship between each pair of adjacent longitudinal members, one end of such unit being thrust-connected with a plate structure adjacent to the side of one longitudinal member and substantially inwardly disposed from the exterior edge of said longitudinal member, the other end of said unit being thrust-connected to the plate structure of the adjacent longitudinal member and disposed substantially near the outer edge of said longitudinal member.

4. A joist supporting structure comprising in combination at least one longitudinally adjustable cross bracing unit, plate structure fixedly secured to the joist, capable of receiving and rigidly securing said cross brace in thrust relationship and a rigid horizontal beam element extending beneath and secured to said joists, said beam being fixedly secured and supported at its ends.

5. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination a substantially rigid beam element fixedly secured and supported at its ends and extending transversely to the exterior edges of said longitudinal structural members and affixed thereto, fixedly secured and vertically adjustable plate structure contiguous with the sides of said longitudinal members and capable of securing a cross bracing member in thrust relationship and a series of cross bracing and stressing units, a unit being disposed between and attached to each pair of adjacent longitudinal members, each unit comprising at least one longitudinal adjustable bracing member one end of said bracing member being thrust connected to said plate structure at a point substantially removed from the exterior edge of said longitudinal member and the other end of said bracing member being thrust connected with said plate structure and with said beam at an area adjacent the contiguous relation of said beam and longitudinal element.

6. A suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination a substantially rigid beam element fixedly secured and supported at its ends and extending transversely and in close relation to the exterior edges of said longitudinal members, means for connecting said beam element with each of said longitudinal members, fixedly secured plate structure at least a portion of which is in contact with the sides of said longitudinal members, said plate structure being capable of receiving and securing a cross bracing member in thrust relationship and a series of cross bracing and stressing units, a unit being disposed between and attached to each pair of adjacent longitudinal elements, each unit comprising at least one longitudinally adjustable bracing member, one end of said bracing member being thrust connected to said plate structure at a point substantially removed from the exterior edge of said longitudinal structural member and the other end of said bracing member being thrust connected with said plate structure and with said beam at an area adjacent the contiguous relation of said beam and longitudinal element.

7. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination a substantially rigid beam element fixedly secured and supported at its ends and extending transversely and in close relation to the exterior edges of said longitudinal members, means for connecting said beam element with each of said longitudinal members, fixedly secured plate structure at least a portion of which is in contact with the sides of said longitudinal members said plate structure being capable of receiving and securing a cross bracing member in thrust relationship and a series of cross bracing and stressing units, a unit being rigidly disposed between each pair of adjacent longitudinal elements each unit comprising at least one longitudinally adjustable cross bracing member angularly displaced from the longitudinal plane of said longitudinal elements each of said units being rigidly secured with at least one end of said bracing member being thrust connected to one of said longitudinal elements.

8. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination a substantially rigid beam element fixedly se-

cured and supported at its ends and extending transversely and in close relation to the exterior edges of said longitudinal members, means for connecting said beam element with each of said longitudinal members fixedly secured, plate structure at least a portion of which is in contact with the sides of said longitudinal members said plate structure being capable of receiving and securing a cross bracing member in thrust relationship and a series of cross bracing and stressing units, a unit being rigidly disposed between each pair of adjacent longitudinal elements each unit comprising at least one longitudinally adjustable cross bracing member angularly displaced from the longitudinal plane of said longitudinal elements each of said units being rigidly secured with at least one end of said bracing member being thrust connected to one of said longitudinal elements, each longitudinal element receiving an upward thrust from at least one of said bracing members.

9. Suspension bridging structure for interconnecting and applying supporting stress to a series of spaced longitudinal structural members such as joists, having in combination a substantially rigid beam element fixedly secured and supported at its ends and extending transversely and in close relation to the exterior edges of said longitudinal structural members, means for connecting said beam element with each of said longitudinal elements, plate structure attached to each of said longitudinal structural members and in contact with the sides of said longitudinal members and a series of cross bracing and stressing units, a unit being disposed between and attached to each pair of adjacent longitudinal elements, each unit comprising a pair of longitudinally adjustable bracing members diagonally disposed in opposite directions between said adjacent longitudinal elements, one end of said bracing members being thrust-connected to said plate structure at a point substantially removed from the exterior edge of said longitudinal member and the other end of said bracing members being thrust-connected with said plate structure and with said beam at an area adjacent the contiguous relation of said beam and longitudinal element.

No references cited.