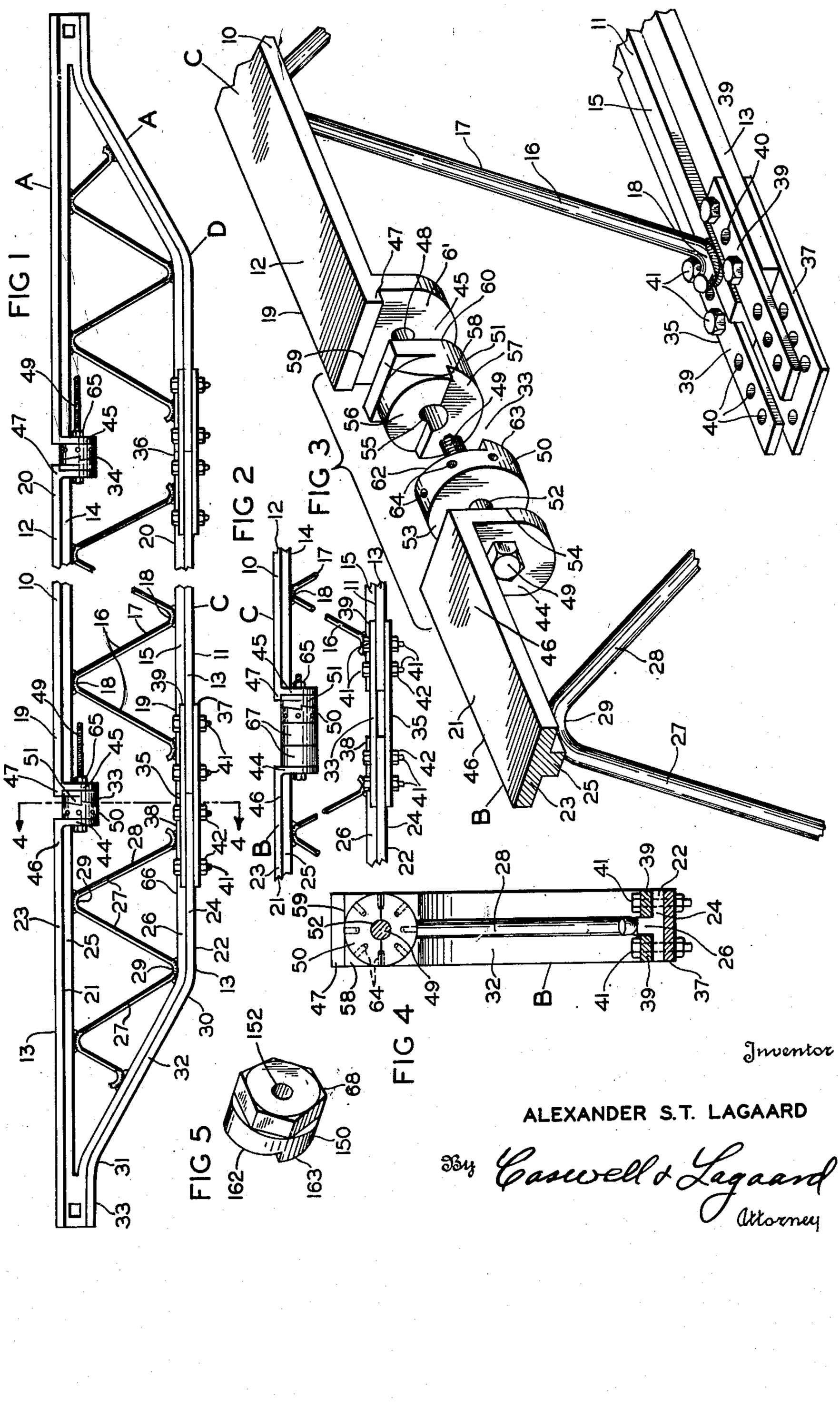
Jan. 27, 1953 A. S. T. LAGAARD 2,626,688

ADJUSTABLE JOIST

Filed Jan. 5, 1950



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Patented Jan. 27, 1953 2,626,688

UNITED STATES PATENT OFFICE

2,626,688

ADJUSTABLE JOIST

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Application January 5, 1950, Serial No. 136,905

9 Claims. (Cl. 189—37)

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The herein disclosed invention relates to adjustable joists particularly of the type having adjacent sections each constructed with an upper and a lower chord and with diagonal truss members therebetween and has for an object to provide adjusting means between the chords whereby one chord may be adjusted independently of the other to vary the camber of the joist.

Another object of the invention resides in constructing the adjoining ends of the upper chords of two adjacent chord sections with abutments extending transversely of the chords and spaced from one another and in further providing spacers therebetween reacting against said abutments, certain of said spacers having contacting surfaces angularly disposed with respect to the direction of extent of said chords and adapted to vary the spacing of said abutments upon relative movement.

A still further object of the invention resides in utilizing as the abutments flanges extending inwardly from said chords and in forming said flanges with aligning holes through which a bolt extends.

An object of the invention resides in constructing the spacers as washers disposed upon said bolt and having contacting spiraling surfaces adapted upon relative rotation of the washers to vary the spacing of said flanges.

Another object of the invention resides in providing restraining means for restraining rotation of one of said washers and in providing torque applying means on the other washer whereby relative movement of the washers may be procured.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings has been illustrated a portion of a joist including the end sections and an intermediate section. These sections are constructed in the form of trusses and have upper and lower chords with diagonal chord members therebetween. The lower chords of adjacent sections are connected together by means of plates bolted thereto. These plates and chords have a number of holes in them whereby the sections may be bolted together to vary the length of the truss by increments depending on the spacing of the holes. The upper chords of adjacent sections have flanges depending therefrom and spaced from one another and formed with holes through which bolts extend. On these bolts are mounted spacers in the form of washers certain of which have spiraling contacting surfaces adapted upon

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relative rotation of the washers to vary the spacing of said flanges and to vary the camber of the truss. One of the flanges is set inwardly of the end of the chord from which it issues to form a shoulder thereon and the juxtaposed washer is formed with a corresponding shoulder adapted to engage said shoulder and restrain rotation thereof. The other washer is formed with a series of circumferentially arranged holes in which a pin may be inserted for applying torque to said washer to rotate the same relative to the restrained washer.

In the drawings:

Fig. 1 is an elevational view of a portion of a joist illustrating an embodiment of the invention.

Fig. 2 is a view of a portion of the structure shown in Fig. 1 and illustrating the parts in altered position.

Fig. 3 is a perspective view of parts of the joist separated from one another.

Fig. 4 is a cross sectional view taken on line 4—4 of Fig. 1 and drawn to a greater scale.

Fig. 5 is a perspective view of a modified form of spacer used with the invention.

The joist illustrated in the drawings has been designated in its entirety by the reference numeral A and consists of three joist sections B, C and D. The section C is an intermediate section while the sections B and D are end sections. It will readily be comprehended that these sections may be made in any length and if desired additional sections, similar to section C, may be employed with the invention.

The joist section C comprises an upper chord 10 and a lower chord 11 arranged in parallel relation. These chords are constructed from structural members T-shaped in cross section and which have flanges 12 and 13 and webs 14 and 15 facing one another and with the flanges 12 and 13 outermost. Between the webs 14 and 15 are arranged diagonal truss members 16 which are constructed from a single rod 17 provided with bends 18 and which form the truss members 16. The bends of said rods are welded to the webs 14 and 15, or may be secured thereto in any suitable manner. The diagonal truss members 16 terminate short of the ends 19 and 20 of the chords 10 and 11 as best shown in Fig. 1 for a purpose which will subsequently become apparent.

The end joist section B is constructed similar to the joist section C and consists of an upper chord 21 and a lower chord 22. These chords are also constructed of structural members T-shaped in cross section and have flanges 23 and 24 and

webs 25 and 26. These chords are arranged with the webs 25 and 26 extending toward one another and are disposed in alignment with the chords 10 and 11. Diagonal truss members 27 extend between the chords 21 and 22 and similar to the truss members 16 are constructed from a rod 28 formed with bends 29 which are welded to the webs 25 and 26 of the chords 21 and 22. The lower chord 22 is formed with bends 30 and 31 which form in said lower chord an upwardly inclined member 32 and a horizontal portion 33 which lies adjacent the upper chord 21. These parts are welded together to form a bearing by means of which one end of the joist may be supported on the supporting structure.

Between the chords 10 and 23 of the truss sections B and C is provided a connection 33 and between the upper chords of sections C and D is provided a similar connection 34. Between the chords 11 and 24 of the truss sections B and C is provided a connection 35 and between the lower chords of the truss sections C and D is provided a connection 36. The connections 33 and 34 being identical and the connections 35 and 36 being identical, only the connections 33 and 35 will be described in detail.

The connection 35 consists of a plate 37 which overlies the end 19 of the lower chord 11 of truss section C and the end 38 of the lower chord 22 of truss section B. This plate fits up against the under side of the flanges 13 and 24 of said chords. On the upper sides of these flanges are arranged bars 39 which are of the same length as the plate 37. The bars 39, the flanges 24 and 13 and the plate 37 all have registering holes 40. Bolts 41 may be inserted through the said holes and nuts 42 screwed on said bolts clamp the parts together. The holes 40 are spaced equal distances apart in both the flanges, the plate and bars so that the truss sections may be extended to different lengths as illustrated in Figs. 1 and 2. By this means joists of differing lengths determined by the spacing of the holes 40 can be readily procured.

The connection 33 utilizes two flanges 44 and 45 which are welded to the ends 19 and 46 of the upper chords 10 and 21 of the truss sections C and B. The flange 44 is at the extreme end of the chord 21 of joist section B while the flange 45 is set inwardly from the end of the flange 12 of chord 10 of joist section C. This leaves a projection 47 on the flange 12 which projects outwardly beyond the flange 45. Formed in the flanges 44 and 45 are holes 48 through which a bolt 49 extends. Mounted on this bolt are two spacers 50 and 51. The spacer 51 has a bore 55 in the same and through which the bolt 49 extends. This spacer has two spiraling surfaces 56 and 57 which spiral in the same direction. The said spacer further is formed with a shoulder 58 which is adapted to engage a shoulder 59 formed by the underside of the projection 47 of flange 12. These shoulders restrain rotation of the said spacer. The spacer 51 has a surface 60 opposite the surfaces 56 and 57 which is adapted to engage the face 61 of the flange 45. The spacer 50 is generally circular in form and has a bore 52 through which the bolt 49 extends. The said spacer has a rear surface 53 at right angle to the bore 52 and which is adapted to seat against the face 54 of the flange 44. The spacer 50 has two spiraling surfaces 62 and 63 which are adapted to fit against the surfaces 56 and 57 of the spacer 51. When the spacer 50 is rotated relative to the spacer 51 these surfaces cause the two spacers to become spread apart and to increase the distance between the two flanges 44 and 45. For the purpose of assisting in rotating the spacer 50 the same is constructed with holes 64 at the periphery of the same and into which a pin may be inserted and the spacer thereby rotated. When the spacers have been spaced the desired distance the entire structure is locked by tightening a nut 65 screwed on the bolt 49.

In Fig. 2 the invention has been shown as applied to the joist sections with the same separated from one another to give a joist of greater length than the length of the joist shown in Fig. 1. In this case the two ends 19 and 66 of the chords 11 and 22 have been pulled apart and the bolts 41 inserted into the outermost of the holes 40 to hold these ends separated as illustrated. To take up the additional space between the flanges 44 and 45 two washers 67 have been utilized which are mounted on the bolt 49 and which abut against one another and against the face 54 on flange 44 and the surface 53 on spacer 50.

In the use of the invention the bolts 41 are inserted in the proper holes 40 which give the truss the desired length. The spacers 50 and 51 are next applied between the flanges 44 and 45 and mounted on the bolt 49. If additional washers such as the washer 67 are needed they are also placed on the bolt as shown in Fig. 2. The washer 50 is then rotated until the flanges 44 and 45 become sufficiently spaced to give the desired camber to the joist. The parts are then locked in adjusted position by screwing up the nut 65 on the bolts 49.

In Fig. 5 a spacer 150 which is a modification of the spacer 50 has been shown. Inasmuch as this spacer is substantially the same as the spacer 50, the correponding parts will not be described in detail but the same reference numerals will be used and preceded by the digit 1. In this form of the invention the spacer 150 is constructed without the holes 64 and instead thereof a head 68 is employed which may be square or hexagonal as desired. In this form of the invention a wrench is applied to the spacer 50 instead of the pin adapted to cooperate with the hole 64 of the spacer 50.

The advantages of the invention are manifest. By means of the construction employed small variations in the length of the upper chord of the joist may be procured whereby the camber of the joist may be adjusted. If, after the structure is in place, the loading becomes excessive, the camber may be further adjusted to level up the floor carried on the same. The parts are easily and readily constructed and may be fabricated at a nominal expense.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, spaced abutments formed on the upper chords of the sections, said abutments facing one another, spacers between said abutments and reacting against said abutments, certain of said spacers having smooth contacting surfaces situated angularly relative to the direc-

tion of extent of the upper chords and adapted upon movement of one of said spacers in the direction of extent of said surfaces to vary the spacing of said abutments while the joist is in erected position and clamping means for holding the spacers in adjusted position.

2. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, spaced abutments formed on the upper chords of the sections, said abutments facing one another, spacers between said abutments and reacting against said abutments, certain of said spacers having smooth contacting surfaces spiraling with respect to an axis extending in the same direction as the direction of extent of said chords and adapted upon rotation of one spacer relative to the other about said axis to vary the spacing of said abutments while the joist is in erected position, and clamping means for holding the spacers in adjusted position.

3. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, spaced abutments formed on the upper chords of the sections, said abutments facing one another, spacers between said abutments and reacting against said abutments, certain of said spacers having contacting surfaces spiraling with respect to an axis extending in the same direction as the direction of extent of said chords and adapted upon rotation of one spacer relative to the other about said axis to vary the spacing of said abutments, one of said spacers being fixed relative to the juxtaposed abutments, torque applying means for rotating the other spacer relative to the fixed spacer to vary the spacing of said abutments and clamping means for holding the spacers in adjusted position.

4. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, spaced abutments formed on the upper chords of the sections, said abutments facing one another, spacers between said abutments and reacting against said abutments, certain of said spacers having contacting surfaces spiraling with respect to an axis extending in the same direction as the direction of extent of said chords and adapted upon rotation of one spacer relative to the other about said axis to vary the spacing of said abutments, a projection on a part fixed relative to one of said chords, a projection on the juxtaposed spacer engaging said first named projection and restraining rotation thereof, torque applying means for rotating the other spacer relative to the restrained spacer to vary the spacing of said abutments, and clamping means for holding the spacers in adjusted position.

5. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, spaced abutments formed on the upper chords of the sections, said abutments facing one another, spacers between said abutments and reacting against said abutments, certain of said spacers having contacting surfaces spiraling with respect to an axis extending in the same direction as the direction of extent of said chords and adapted upon rotation of one spacer relative to the other about said axis to vary the spacing of said abutments, one of said chords extending transversely thereof, a shoulder on the juxtaposed spacer engaging said first named shoulder and restraining rotation thereof, torque applying means for rotating the other spacer relative to the restrained spacer to vary the spacing of said abutments, and clamping means for holding the spacers in adjusted position.

6. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, flanges extending downwardly from said chords and spaced from one another said flanges having aligning holes therein, a bolt extending through said holes, washers on said bolt between said flanges and reacting against said flanges, certain of said washers having contacting surfaces spiraling with respect to the axis of said bolt, and adapted upon rotation of one washer relative to the other to vary the spacing of said abutments, restraining means for restraining rotation of one of said washers and torque applying means for rotating the other washer relative to the restrained washer.

7. In an adjustable joist, a first joist section and a second joist section disposed end to end, each comprising upper and lower chords and diagonal truss members therebetween, connections for adjustably connecting the lower chords of the sections together, flanges extending downwardly from said chords and spaced from one another said flanges having aligning holes therein, a bolt extending through said holes and washers on said bolt between said flanges and reacting against said flanges, certain of said washers having contacting surfaces spiraling with respect to the axis of said bolt, and adapted upon rotation of one washer relative to the other to vary the spacing of said abutments, one of said flanges being set inwardly from the end of the chord from which it issues to form a transverse shoulder on said chord, a shoulder on the juxtaposed washer engaging the shoulder on said chord and torque applying means for rotating the other washer relative to the restrained washer.

8. A camber adjusting device for adjustable joists comprising a first joist section and a second joist section each disposed end to end, each consisting of aligning upper and lower chords with diagonal truss members therebetween together with connections for connecting the lower chords of the sections together, said adjusting device comprising spaced abutments formed with aligning holes and with facing surfaces and extending downwardly from the juxtaposed ends of the upper chords, a clamping bolt extending through the holes in said abutment, two coacting spacers formed with aligning holes and threaded on said bolt, said spacers having thrust resisting end surfaces engaging said surfaces of said abutments and smooth contacting surfaces spiraling with respect to the axis of said bolt and engaging one another, one of said spacers having a shoulder and means fixed relative to the joist and having a shoulder for engagement with the shoulder of the spacer and torque applying means formed on the other spacer for rotating the

spacers relative to one another while the joist is in erected position to vary the camber of the joist.

9. A camber adjusting device for adjustable joists comprising a first joist section and a second joist section each disposed end to end, each consisting of aligning upper and lower chords with diagonal truss members therebetween together with connections for connecting the lower chords of the sections together, said adjusting device comprising spaced abutments formed with aligning holes and with facing surfaces and extending downwardly from the juxtaposed ends of the upper chords, locking means at the locality of the abutment of one of the joist sections, a clamping bolt extending through said holes, two coacting spacers formed with aligning holes threaded on said bolt, said spacers having thrust resisting end surfaces engaging said surfaces of said abutments and smooth contacting surfaces

spiraling with respect to the axis of said bolt and engaging one another, one of said spacers having complemental locking means coacting with the locking means of the joist and torque applying means formed on the other spacer for rotating the spacers relative to one another while the joist is in erected position to vary the camber of the joist.

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