Oct. 14, 1952 A. A. HOCHER 2,613,966

CLAMP

Filed June 25, 1949

Fig. 1.

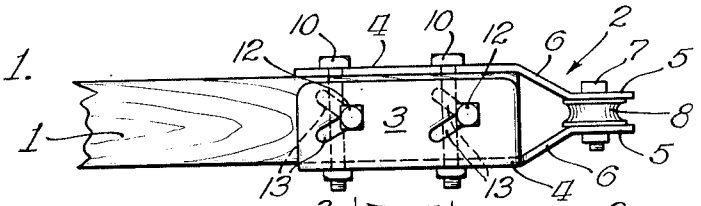


Fig. 2.

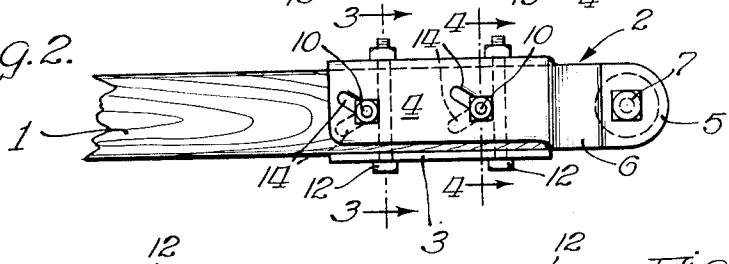


Fig. 3.

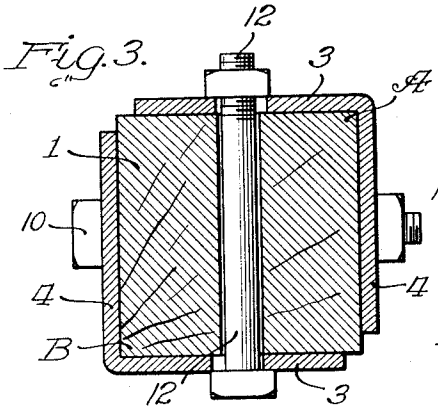


Fig. 4.

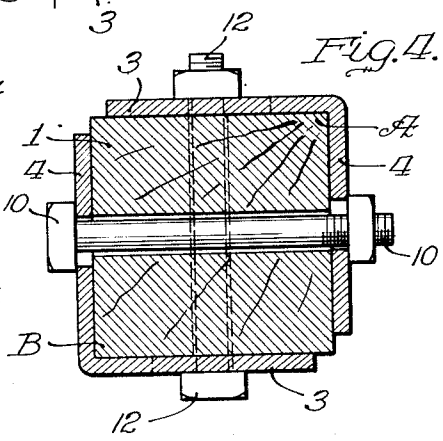


Fig. 5.

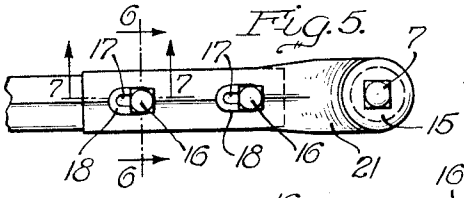


Fig. 6.

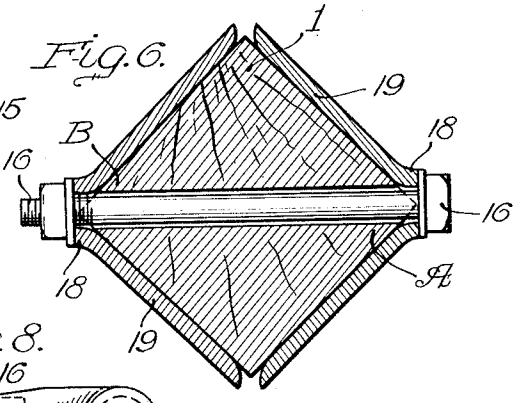


Fig. 7.

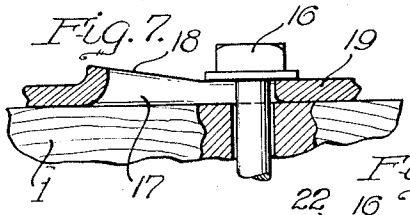


Fig. 8.

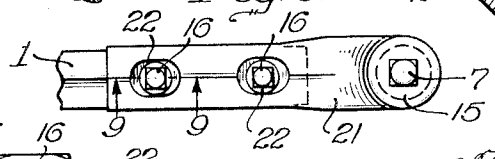
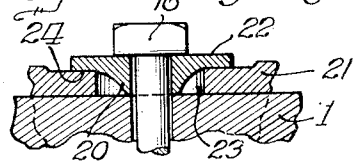


Fig. 9.



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CLAMP

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Application June 25, 1949, Serial No. 101,440

9 Claims. (Cl. 287—20.3)

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My invention relates to clamps such as are employed for attaching a load in tension (or compression) to a wood bar or timber acting longitudinally of the same.

I am aware that many prior workers have developed devices for this purpose, but the problem of providing a simple, efficient and effective clamp for holding a grip upon a wood bar or timber under the diverse conditions of moisture content to which an exposed installation is subject has presented a continuous challenge.

In my prior copending application, Serial Number 81,005, filed March 11, 1949, I have taught the novel principle of building a self-energizing action into the metal parts of the clamp and to cause this action to be applied on two or on four sides of a wood bar or timber of rectangular cross section. In my copending application, Serial Number 101,438, filed June 25, 1949, I have disclosed an alternative structure embodying the said principle. In the preferred embodiments of those inventions, the four sides of the wood bar are engaged by pressure plates which are adapted by their movement relative to the bolts which initially clamp them upon the side of the bar to bring into play a wedging action endwise of the bolts which tensions the bolts and presses the plates flatwise against the faces of the wood bar.

This requires the connection of the plates for common endwise movement in order to gain the full effect of substantially uniform constriction upon the cross section of the bar. I have conceived that the full cross section may be gripped or constricted by two members only, such members being of angle section and being pressed diagonally upon the bar, as it were from opposite corners. The pressure of the two angle shaped clamp members upon diagonal opposite corners, and consequently upon all four sides, may be accomplished either by pulling upon the legs of each angle bar, or by pressing upon the corner of the angle bar, as will appear from the specific embodiment herein illustrated. The wood bar or timber is rectangular, and preferably square in cross section, but a deviation from square cross section is not objectionable.

Now in order to acquaint those skilled in the art with the manner of constructing and operating a device embodying my invention, I shall describe, in connection with the accompanying drawings, a specific embodiment thereof and the mode of its construction and use.

In the drawings:

Figure 1 is a side elevational view of the clamp

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of my invention applied to a wood bar, such as may be a part of a guy wire insulator or the like;

Figure 2 is a similar view of the device shown in Figure 1 taken at right angles to the view of Figure 1;

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a similar cross-sectional view taken on the line 4—4 of Figure 2;

Figure 5 is a side elevational view of a modified form of my invention;

Figure 6 is a cross-sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 5;

Figure 8 is a plan view of a second modification; and

Figure 9 is an enlarged section taken on the line 9—9 of Figure 8.

Referring now to Figures 1 to 4, the rectangular wood bar 1, which is preferably square in section, is adapted to be engaged by the clamp or grip 2 for putting the said bar 1 under tension. As will be apparent later, obviously the load might be arranged to be in compression with suitable modification, but in either case, the load is intended to be applied substantially axially in line with the longitudinal axis of the bar 1. The clamp 2 comprises two clamp members each consisting of a shorter plate 3 and a longer plate 4, preferably formed of a piece of flat plate stock, bent at right angles to each other, so as to form an L-shaped or angular cross section. The longer plate 4 has a perforated lug 5 connected by a diagonal portion 6, so that the lug 5 is offset towards the longitudinal axis of the device, and the two lugs 5, 5 have bolt holes in register for receiving a bolt 7 for applying the load to the clamp members equally. Such load may, for example, be applied through a sheave 8 mounted on the bolt 7 and adapted to have passed around it a cable or strand of a guy wire or the like. The plates of each member are placed flat in engagement with the corresponding adjacent two sides of the wood bar 1. Bolts 10, 10 extend through slots in the longer plates 4, 4 and likewise bolts 12, 12 extend through slots in the shorter plates 3, 3. The bolts in each case are set in closely fitting elongated holes in the wood bar 1, and these bolts provide the initial tension for clamping the plates against the flat faces of the bar and for providing the resistance of the self-energizing action which is accomplished by the clamp. The slots 13, 13 in the short bars, as

shown in Figure 1, have the slots 13, 13 inclined from a position which is substantially central of the plates rearwardly and towards the angle joining the plate 4. The plate 4, as shown in Figure 2, has similar diagonal slots 14, 14 extending rearwardly and towards the junction of the plate 3, 4 of which it is composed. Thus the plate 3 on the front side of Figure 1 receives the bolt 12 which at the other side of the clamp passes through a similar slot inclined upwardly as shown in dotted lines therein. Similarly, the bolts 10, 10 extend through the diagonal slots 14, 14 shown as inclined upwardly to the rear of Figure 2 in the front plate 4 and extend out through similar slots 14, 14 shown in dotted lines in Figure 2 and extending downwardly to the rear. Hence, any pull on the lugs 5, 5 tends to move the two connected right angle plates of each clamp member so that the side of the slot farthest away from the corner where the plates are joined bears against the side of the bolt beneath the head of the same and tends to pull the corresponding pair of plates constituting one member down diagonally upon the wood bar 1 upon opposite corners, which are the corners A and B as shown in Figures 3 and 4. Since the slot at one end of a bolt 12, for example, tends to pull the bolt down as viewed in Figure 1, and the plate 3 on the opposite side tends to pull the end of the bolt up, as viewed in Figure 1, there is a tendency to rock or swing the bolt sidewise in the hole in the wood through which it passes. Such tendency is to make the bolt assume a position diagonal to the shortest distance between the two faces. That is to say, whatever tendency there is to pull the bolt head 12 shown in Figure 1 downwardly and its opposite head upwardly will tend to increase the tension of the bolt against the plates and have a self-energizing action from that fact alone. This is in addition to the self-energizing action of pulling the angle bar down upon the corner A or B, as the case may be. The same thing occurs in connection with the bolts 10, 10, and they have both the self-energizing action of pulling the legs of the angle down upon the corresponding sides, and also of being self-energizing to the extent of tending to swing the bolts laterally in opposite directions at their ends by such side pressure as the slots put upon them. The resultant effect is that when a load is put upon the clamp great enough to cause any slippage of the same, such slippage will result immediately in increasing the pressure of the plates upon the surface of the wood to the extent that further slippage does not occur and the load will be sustained. Obviously, the bolts are tensioned initially sufficiently to apply the friction intended to carry the load, but due to atmospheric conditions, such as drying out of the wood, such friction may not remain as initially imposed, and then the self-energizing action of clamping as above described comes into play to tighten the clamp upon the cross section of the bar 1 and grip the same with the necessary friction required to carry the load, so long as the same is within the capability of the device.

In Figures 5 to 7 I have shown the two clamping members constructed out of angle bar sections, the front ends of which, that is, towards the left, have been pressed or stamped to the desired shape to provide two parallel offset lugs 15, 15 which are flattened out relative to the angle and shaping the same into two parallel offset ends between which a sheave may be embraced and held by a bolt 7 or the like. While standard commercial rolled sections may be employed and the ends flattened out, trimmed and stamped to the desired form, the preferred method of manufacture is to stamp the fitting out of plate stock. According to this construction, a pair of diagonally disposed bolts 16, 16 extend through slots 17, 17 formed in the crotch of the angle through the body of the clamp. The edges of the hole are flanged upwardly as indicated at 18 upon each side of the slot to provide an integral upwardly facing wedging surface under the head of the bolt 16. A washer may, if desired, be provided between the head of the bolt and the inclined wedge surface 18. The two clamp members are identical and are bolted upon opposite diagonal corners A and B of the square wood bar 1, as shown in Figure 6. The bolts are initially tightened up to give the desired pressure upon all four sides of the wood bar, and the legs of the angles at the forward end may be slightly flared outwardly, so that forward movement of the clamp member will tend to pinch the cross section more tightly, particularly after the same has suffered some plastic displacement due to atmospheric influence and pressure. The wood is capable of plastic deformation by pressure, as is well known, particularly when damp, and it tends to shrink and set when it dries out. In operation, when the two angle shaped clamping members are bolted upon the opposite corners A and B of the wood bar 1, sufficient surface friction between the clamp members and the wood bar 1 is imposed to hold the normal load. If the wood tends to dry out, or if the load tends to go beyond that for which the initial tensioning has been provided, the clamp members tend to slip along the surface of the wood bar 1 and bring the wedging surfaces 18, 18 under the heads of the bolts on each side, with the result that the clamp members are thrust towards each other and clamp the wood bar more firmly between them. The ends of the legs of the angles are spaced far enough away from each other at the corners to allow the necessary inward travel as required within the limits of the device.

The above method of securing the wedging action between the clamping members and the bolts involves the provision of the inclined surfaces on the clamp members as disclosed in my prior copending application Serial Number 81,005, filed March 11, 1949. It is not essential that the inclined surfaces or wedges be carried by the clamp members, since the same effect may be had by carrying the inclined surfaces or wedges upon the bolts themselves, as shown in my prior application Serial Number 101,438, filed June 25, 1949, and as shown in Figures 8 and 9. The construction of Figures 8 and 9 is similar to that of Figures 5 to 7, except that instead of putting the inclined metal surface upon the clamp member, the inclined surface is disposed in the form of a conical or tapered projection 20 on the wedge washer 22.

The bolt hole 23 is preferably an elongated opening or slot, and the projection 20 may be a flattened cone through the center of which the shank of the bolt 16 passes. Each clamp member 21 is similar to the clamp member 19 except for the formation of the opening and the disposal of the wedge washer 22 in the opening. If now the bolts 16 have been tightened up for the initial application of load, and pull upon the lugs or ears 15, 15 should exceed the friction between the clamp member and the surface of the wood

bar 1, the said clamp members 21, 21 will slip to the right under the heads of the bolts 16, 16 at each side. Thereupon the margin 24, as shown in Figure 9, will ride under the wedge-shaped projection 20 and force the corresponding clamp member 21 inwardly against the surface of the wood bar.

While standard angle bars may be employed as raw material for this purpose, it is to be understood that such angle bars may be constructed of plate of the desired thickness cut and stamped into the desired shape.

Hence, according to the teachings of the present invention, the legs of the angle clamps are forced upon the lateral surfaces of the wood bar through the medium of the initial tension of the bolts, and thereafter, by the self-energizing action of movement of the clamping members relative to the bolts, the pressure is increased until the friction necessary to sustain the load is attained.

I do not intend to be limited to the details shown or described, except as they are made essential by the following claims, since those skilled in the art will modify and alter the embodiments of my invention herein disclosed to suit their own particular requirements.

I claim:

1. In a device of the class described, the combination of two angle shaped clamp members adapted to be disposed upon a rectangular wood bar with their legs in the form of plates disposed in contact with two adjacent sides of said bar, each member having a forwardly extending ear, means for connecting said ears to constitute a hitch, bolts adapted to be seated in holes in the bar and extending through the plates and having heads for clamping the plates upon the wood bar said members having registering bolt holes allowing longitudinal motion of the members relative to the bolts, said bolts and members having cooperating wedging surfaces, including in each case a surface at an angle to the line of force applied by the hitch for providing a self-energizing grip upon the face of the bar when the members move relative to the bolts.

2. In a device of the class described, a pair of clamp members each having a clamping portion of L-shaped cross section adapted to embrace the adjacent sides of a wood bar of substantially rectangular cross section to be clamped, and a forwardly extending lug portion for attachment of a load, bolts adapted to be seated in the wood bar and extending through registering slots in the members, said bolts having heads for initially clamping said members upon said bar, said members and said bolts having interengaging self-energizing wedge surfaces including surfaces inclined to the direction of motion of the members on the wood bar when the load is applied to said members.

3. The device of claim 2 wherein the bolts are disposed at substantially right angles to the flat sides of the clamping portions, and said clamping portions having diagonal slots inclined rearwardly towards the corner of the corresponding L-shaped section.

4. The device of claim 2 wherein the bolts extend through the opposite corners of both clamping portions and said members and bolts have self-energizing wedge surfaces between them for forcing the members towards each other upon motion of the members relative to said bolts.

5. An angle clamp member comprising a longitudinally extending angle section with one leg extending forwardly beyond the other, said extending end having an offset lug apertured to provide an eye, said angle section carrying a pair of plate-like legs, said legs having slots inclined rearwardly towards the corner of the section.

6. An angle clamp member for clamping a rectangular wood bar having a clamping portion and a lug portion, the clamping portion comprising a pair of integral platelike portions lying at right angles to each other and each platelike portion having at least one bolt hole for clamping bolts, said bolt holes consisting of slots inclined to the longitudinal axis of the corresponding platelike portion and allowing endwise motion of the member relative to the bolts, and the lug portion comprising an extending ear offset toward the longitudinal axis of the bar to be clamped.

7. In combination, an angle clamp member for clamping upon two adjacent sides of a rectangular wood bar having a clamping portion and a lug portion, the clamping portion comprising a pair of integral platelike portions lying at right angles to each other and having one or more bolt holes for clamping bolts, bolts extending through said holes and adapted to extend through and be anchored in the wood bar, said bolt holes allowing endwise motion of the member relative to the bolts, and the lug portion comprising an extending ear offset toward the longitudinal axis of the bar to be clamped, there being a wedging surface between the bolt head and the adjacent surface of the clamping portion about the slots to provide a self-energizing clamping action of the member when the same moves relative to the bolt.

8. The device of claim 1 wherein the bolts are arranged in pairs, said pairs being spaced from each other lengthwise of the plates, the bolts of each pair lying in substantially the same transverse plane and at right angles to each other.

9. The device of claim 2 wherein the bolts are arranged in pairs, said pairs being spaced from each other lengthwise of the clamping portions, the bolts of each pair lying in substantially the same plane at right angles to each other.

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