Sept. 25, 1951 J. E. BOWER 2,569,284

CLAMPING DEVICE

Filed July 10, 1946

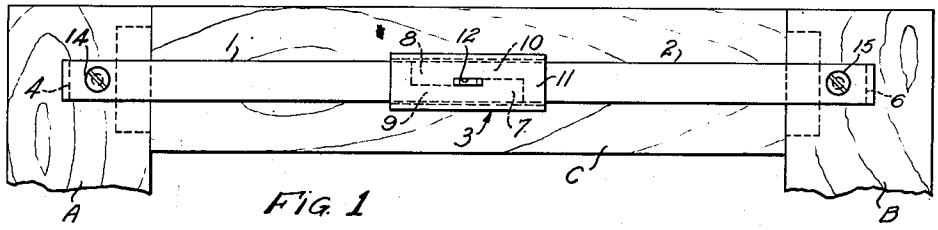


FIG. 1

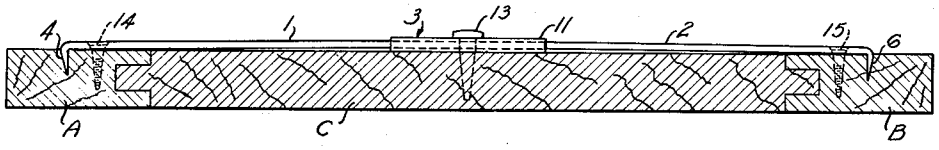


FIG. 2

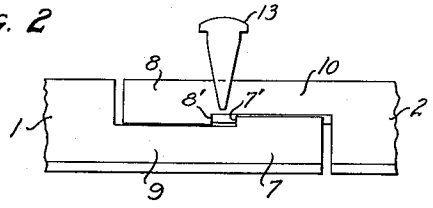


FIG. 3

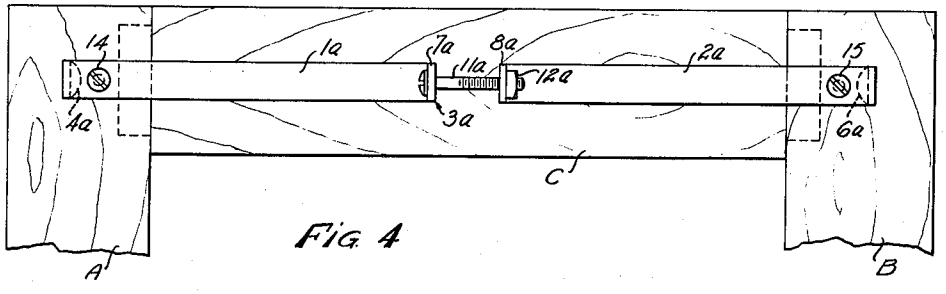


FIG. 4

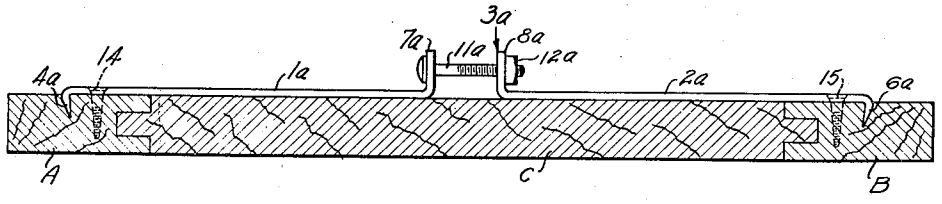


FIG. 5

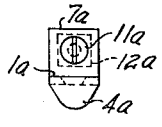


FIG. 6

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CLAMPING DEVICE

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3 Claims. (Cl. 20—38)

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This invention relates to devices for clamping structural members together. More particularly the invention concerns providing a simple improved device for gripping a pair of structural members and drawing them relatively toward one another and retaining the same in position against each other or an interposed member.

While numberless prior art devices having the same general purposes as the present invention have long been known, the present invention provides for the first time a simple, inexpensive, clamping device with a pair of rigid strap elements having integral bit portions adapted to firmly grip the members to be drawn together, with the straps lying close against the surfaces of the members and being coupled by a simple mechanical device capable of shortening the span of the bit portions to exert clamping forces on the members and retaining the clamp permanently in place as a structural element.

The invention may be found useful in many ways. Strictly by way of example, it has been found particularly advantageous and effective as a means of clamping and reinforcing the joints of such structures as screen door frames, which have a well known tendency to become loosened and sag out of shape after use. Actual results obtained in applying the invention to the particular field of renovation of screen door frames have been remarkable. And it is believed that the invention supplies a solution to a problem of old standing in the art.

An object of the invention is to provide a handy, inexpensive permanent clamping element for frame structures.

Another object is to provide an improved clamping device with integral bits capable of rigidly gripping wooden members into which they are to be driven.

Still another object is to provide in such a device an improved coupling for joining portions of a contractible strap.

Still another object is to provide a permanent structural frame clamping and reinforcing device which will lie close to the frame and present a neat appearance.

A further object is to provide an externally reinforced framework having strength, permanence, simplicity and neat appearance.

The above and still further objects and advantages which will appear in the following specification may best be carried into effect as described hereinafter with reference to the accompanying drawing in which like reference characters are employed to designate the same or similar parts.

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Fig. 1 is a fragmentary front elevation of a structural frame, showing a preferred form of the clamping device of the invention with the key element removed;

Fig. 2 is a cross sectional view of the structure of Fig. 1 looking from below;

Fig. 3 is an enlarged detail view of the joint in the clamping device of claim 1 with the sleeve portion removed and the key in position for insertion;

Fig. 4 is a view similar to Fig. 1 showing a modified form of clamping device according to the invention;

Fig. 5 is a view similar to Fig. 2 showing the clamping device of Fig. 4; and

Fig. 6 is an end view of the clamping device of Fig. 4.

The device of the present invention as embodied in a preferred form in the structure shown in Fig. 1 of the drawing, consists of a rigid integral strap 1, and a second similar strap 2, each formed in a special manner, preferably from sheet, or strip steel stock. Straps 1 and 2 are joined by a clamping mechanism 3 and the resulting device is shown in place on a frame structure having lateral members A and B joined by, and clamped firmly against the ends of an interposed transverse member C, according to the present invention.

A relatively short integral end portion of strap 1 is bent sharply over perpendicular to the longitudinal axis of the strap and sharpened in any desired manner to form a bit 4 suitable for penetrating into the body of a structural member such as A, to anchor the strap 1 firmly against displacement in the direction of the main axis of the strap. The other end of the strap is cut away laterally from one side to a form suitable to cooperate with other elements of the clamping mechanism 3 as more fully described hereinafter.

Strap 2 is formed similarly to strap 1, its bit 6 being shown engaging frame member B.

The clamping mechanism 3 in the preferred form includes a species of laterally scarfed joint between straps 1 and 2 in which short extreme end portions 7 and 8 of straps 1 and 2, respectively, are formed with a width extending from one edge of the strap slightly past the longitudinal center line and are connected with the main body of the strap by portions 9 and 10 of width slightly less than half the full width of the strap and length substantially greater than the length of end portions 7 and 8. In defining the joint structure in this specification and the appended claims, the term "neck" may be used to desig-

nate portions 9 and 10, and when so used will be understood to define: a narrow straight sided portion of the strap. And the term "head" may be employed to designate portions 7 and 8 and will be understood, when so used, to define: a portion integrally joined to the "neck" and extending laterally thereof to form a shoulder (7', or 8') facing the midsection of the respective strap.

Element 11 of mechanism 3, is a rectangularly formed sleeve member having an internal width substantially equal to that of straps 1 and 2, and is adapted to be slidable along the straps and to enclose the scarfed joint formed by the cooperating portions 7, 8, 9 and 10, of straps 1 and 2.

When in position enclosing portions 7, 8, 9, and 10, element 11 will lock straps 1 and 2 together in alined relation in such a manner that abutment of shoulders 7' and 8' will limit extension of the assembly and straps 1 and 2 will be longitudinally slidable in span shortening and lengthening relation, through a limited range, established by the difference between the lengths of portions 7 and 9, and 8 and 10, respectively.

Element 11 is provided with a through aperture 12, alinable with the key way formed between portions 7, 8, 9, and 10 when placed in cooperating joint forming relation, as shown in Fig. 1. Aperture 12, preferably, should conform in width with, and have a length slightly greater than, the key way bounded by portions 9 and 10 and shoulders 7' and 8'.

A key 13 is shown as rectangular in cross section and having a head slightly greater in width than aperture 12 of element 11. The shank has a short parallel sided portion adjacent the head, about equal in width to the maximum length of the key way formed between shoulders 7' and 8' and in length to the thickness of element 11, and is tapered from the parallel sided portion to a point of minimum width, for a length depending on the thickness of the frame member C into which the key is intended to penetrate after passing through element 11. The tapered key 13 acts as a wedge between shoulders 7' and 8' to enlarge the key way when inserted, and draw straps 1 and 2 longitudinally toward one another in span shortening relation.

It will be clear from Fig. 3 how tapered key 13 can be driven into the key way defined by portions 9 and 10 and shoulders 7' and 8' to contract the joint and the strap assembly.

It will also be readily understood that element 11 need not be a full tubular member, but obviously may be a channel covering the joint only on the face away from the frame member C and having side flanges approximately of the same depth as the thickness of straps 1 and 2. When such a channel member is employed, no part of element 11 will extend between straps 1 and 2 and the frame members to be joined, and the straps may lie flat against the surface of the frame. Element 11 may accordingly be considered either a closed (as shown) or open channel member.

The invention is used in clamping and permanently reinforcing a frame portion such as A, B, and C by assembling elements 1, 2 and 11, with the span between bits 4 and 6 slightly greater than minimum by approximately the amount it is estimated that frame members A and B can be drawn up and compressed tightly against the ends of member C. With the assembly held temporarily at this span, bits 4 and 6 are pressed or driven into frame members A and B as by hammering. And key 13 is then inserted through aperture 12 of element 11 and pressed or driven home, its tapered tip forcing shoulders 7' and 8' apart and entering the member C, to maintain the clamping assembly permanently in position as a clamping and reinforcing element of the structural frame. The bits 4 and 6 will effectively grip frame members A and B and draw and retain them firmly against the ends of member C.

In order to keep bits 4 and 6 fully embedded in frame members A and B, screws 14 and 15 may, if desired, be driven into such members through suitable holes provided near the bit ends of straps 1 and 2, as shown in the drawing.

In the modified form shown in Figs. 4, 5 and 6 of the drawing a modified coupling mechanism 3*a* is employed. In this form the adjacently related ends of straps 1*a* and 2*a* of the alined strap assembly are sharply bent in a direction opposite the corresponding bits 4*a* and 6*a* as shown at 7*a* and 8*a*, to form opposed flanges when the straps 1*a* and 2*a* are assembled in longitudinally alined relation. Bolt 11*a* is passed through suitable alined holes in opposed flanges 7*a* and 8*a* and nut 12*a* threadedly engages bolt 11*a* and is operable to draw the flanges toward one another as will be clear from the drawing.

The modified form of clamping arrangement shown in Figs. 4 to 6, while perhaps not so desirable from the standpoint of appearance, is nevertheless effective and perhaps even simpler to apply than the other form.

It will be apparent to persons skilled in the art that the two forms of clamping mechanism 3 and 3*a* illustrated in the drawing may be replaced by many readily adaptable modified forms and functional equivalents without departing from the spirit of the invention. And it will be understood that the scope of the invention disclosed herein is limited only by the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In an adjustable length device the combination of a pair of complementary substantially identically formed straps each comprising a longitudinally extending body, a hook end, and a neck intermediate said hook end and said body, said hook end having a transverse width greater than half but less than the full width of said body, said neck having a transverse width less than half the full width of said body and having a length greater than the length of said hook end, a first shoulder formed between said neck and said hook end, a second shoulder formed between said neck and said body, said straps being longitudinally alined for limited longitudinal displacement relative to each other through the insertion of each of said hook ends between said first and second shoulders of the respective complementary strap to form overlapping hook ends affording between said first shoulders of said alined straps an adjustable length longitudinally extending slot lying between opposed portions of said necks, a longitudinally extending channel element embracing said hook ends of said straps to restrain said hook ends against transverse displacement relative to one another, said channel element having a channel width substantially equal to the transverse width of one of said straps and comprising a web having a longitudinally extending aperture, at least a portion of said aperture being in register with said slot, and a tapered key extensible through said aperture and said slot and cooperating with said first shoulders of

said straps to force said hook ends apart along said channel to draw said bodies of said straps together and shorten the length of said device.

2. A retractile clamping device comprising a longitudinally extending first member having first and second end portions, said first end portion being cut away to form a hook, said hook defining one half of an interlocking scarf joint, said second end portion carrying fastening means, a longitudinally extending second member longitudinally alined with said first member in complementary relation thereto and comprising first and second end portions, said first end portion of said second member being cut away to form a hook similar to said hook of said first member, said hook defining the other half of said interlocking scarf joint, said second end portion of said second member carrying fastening means, means providing notches in each of said first end portions of said members, each said notch lying adjacent said hook between said hook and said fastening means and having a length greater than the length of said hook, said notch means of said first member receiving said hook of said second member and said notch means of said second member receiving said hook of said first member into interlocking and limited longitudinally slidable engagement to form said interlocking scarf joint joining said members and affording a limited longitudinal displacement of said members relative to one another, said notch means of said members cooperating with said hooks of said complementary members to define a longitudinally extending slot of adjustable length enclosed between said hooks, a collar embracing said hooks in slidable relation therewith for holding said hooks in engagement against transverse movement and for maintaining said interlocked scarf joint between said members, said collar having a section pierced to form an aperture therein in register with said slot, and a tapered key movable through said aperture into said slot between said hooks and coacting with said hooks to exert a longitudinally directed force upon said hooks to force said hooks longitudinally apart within said collar and to draw said members longitudinally toward each other to shorten the span between said fastening means.

3. A retractile device for drawing together two or more structural members against a spacing member interposed between said structural members comprising a longitudinally extending first strap having one end portion cut away to form a hook, said one end portion defining one half of an interlocking scarf joint and the other end

portion of said strap being fastened to one of said structural members, a longitudinally extending second strap longitudinally alined with said first strap in complementary relation thereto and having one end portion cut away to form a hook similar to said hook of said first strap, said one end portion of said second strap defining the other half of said interlocking scarf joint and the other end portion of said second strap being fastened to another of said structural members, means providing notches in each of said one end portions of said straps, each said notch lying adjacent said hook between said hook and the other end portion of said strap and having a length greater than the length of said hook, said notch means of said straps respectively receiving said hooks of said complementary straps into interlocking and limited longitudinally slidable engagement to form said interlocking scarf joint joining said one end portions of said straps and affording a limited longitudinal displacement of said straps relative to one another, said notch means of said straps cooperating with said hooks of said complementary straps to define a longitudinally extending slot of adjustable length enclosed between said hooks, collar means embracing said one end portions in slidable relation therewith for holding said one end portions in engagement against transverse movement and for maintaining said interlocked scarf joint between said straps, said collar means having a section pierced to form an aperture therein in register with said slot, and a tapered key movable through said aperture into said slot between said hooks and coacting with said hooks to exert a longitudinally directed force upon said hooks to force said hooks longitudinally apart within said collar means to draw said straps toward each other to shorten the span between said one of said structural members and said another of said structural members, said key comprising fastening means penetrating said spacing member to fasten said collar means securely to said spacing member.

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