May 30, 1961 M. F. JACKMAN 2,986,183

CLAMPING MECHANISM

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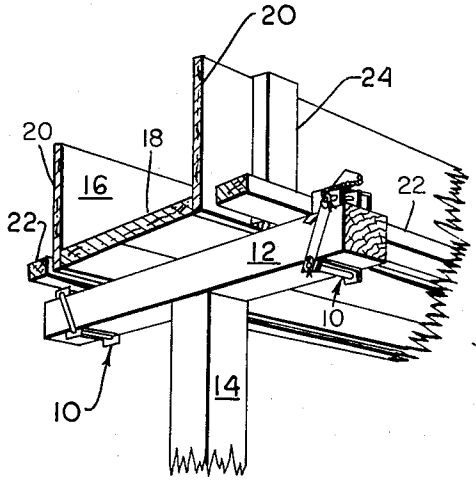



FIG. 3

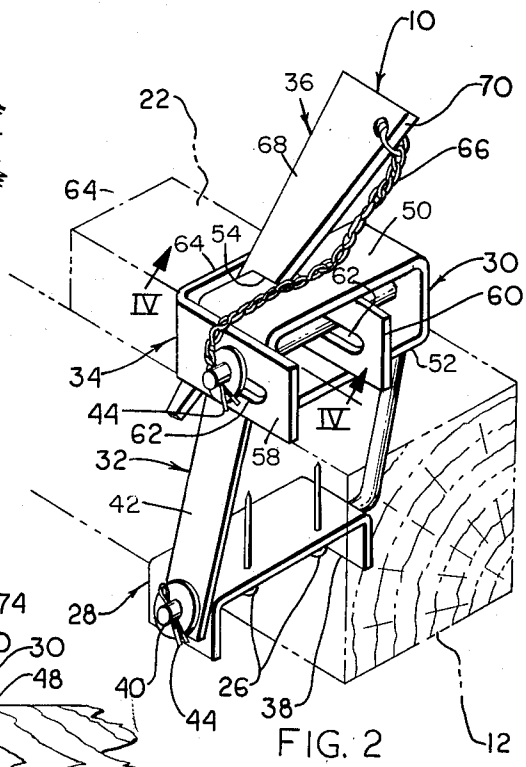



FIG. 2

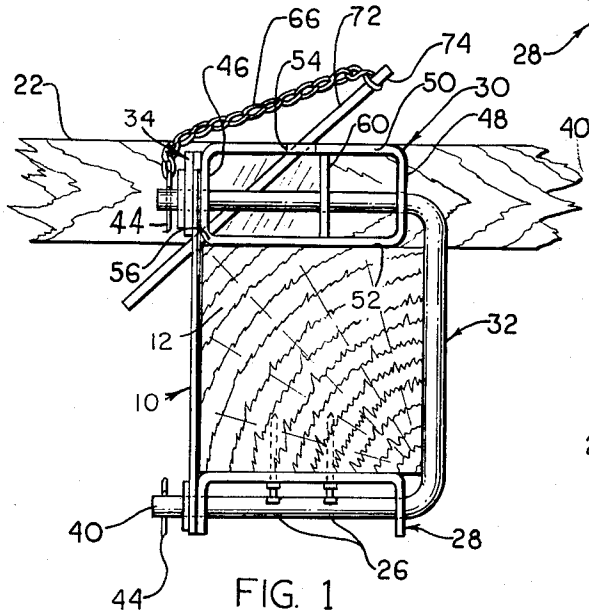



FIG. 1

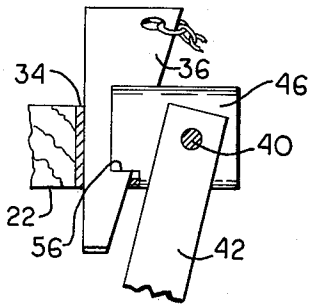



FIG. 4

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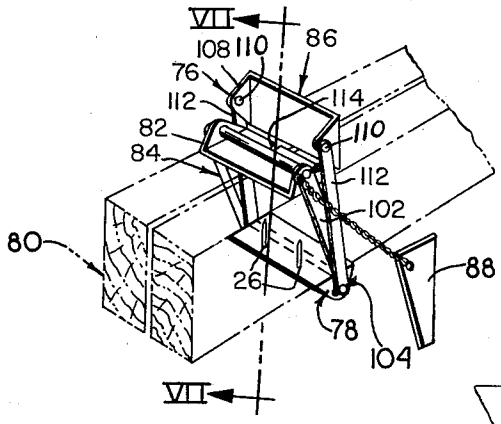



FIG. 6

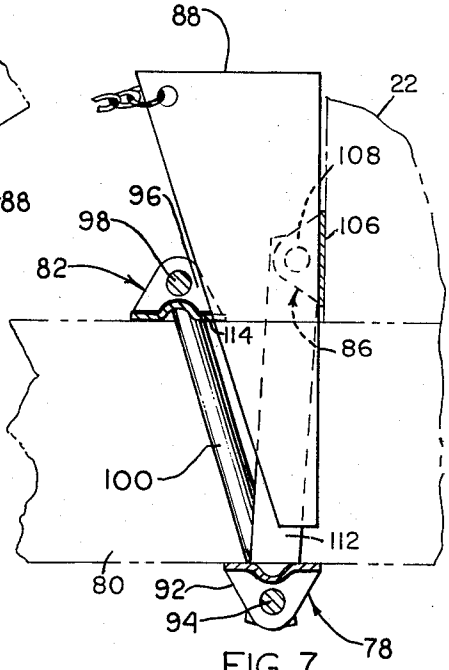



FIG. 7

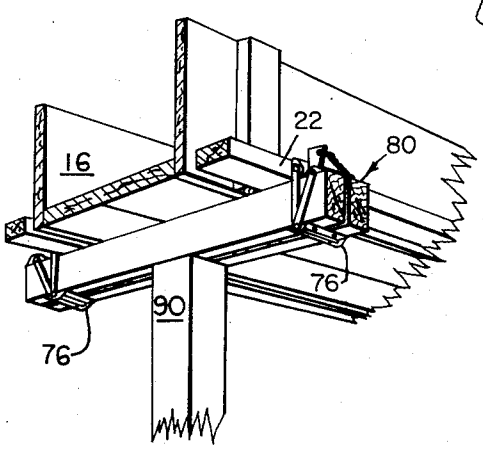



FIG. 5

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# CLAMPING MECHANISM

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3 Claims. (Cl. 144—291)

The present invention relates to a clamping mechanism, and more particularly to a clamping mechanism for use in affording a wedging action between a pair of elements, thereby tending to cause one of said elements to be urged into a desired position.

The clamping mechanism of the present invention is particularly adapted to afford a clamping action between a beam box and the usual crosshead which carries such a beam box. More particularly, in the construction industry it is conventional practice to form the horizontal concrete beams of a building by providing a beam box to support the concrete, and by providing crossheads to support the beam box. The crossheads are conveniently mounted to upright posts, and a plurality of such posts and crossheads are disposed along the length of the planking or shoring to support it in position. It is desirable to be able to quickly assemble the beam box and clamp it in position ready for the pouring of the concrete, but it is also desirable to provide a means whereby the beam box may be quickly and readily released from such assembly after the concrete has hardened. For this reason nails and similar types of fasteners have not proved to be completely satisfactory, and a more expeditious and convenient means has been sought.

Accordingly, the clamping mechanism of the present invention comprises a pair of jaws for engaging opposite sides of a crosshead or comparable element, and a means for linking together and combining movement of the pair of jaws, whereby one of the jaws is movable to a limited extent, but is constrained or limited against movement beyond a predetermined point by the engagement of the other jaw with the element. In one embodiment of the invention this engagement is by rigid securement or anchoring of the one jaw to the crosshead which thus positively prevents movement of the jaw beyond a predetermined point.

The clamping mechanism also includes a third jaw which is associated or connected with one of the above-mentioned pair of jaws, and which is movable with that jaw along a side of the element and into engagement with the beam box or second element, sometimes hereinafter referred to generally as shoring. It is against this second element that the wedging action is applied. For this purpose a wedging element is provided which is adapted to be disposed between the third jaw and that one of the pair of jaws with which the third jaw is associated for moving the third jaw along the adjacent side of the element.

The wedge means or element is preferably made of increasing cross section, and is mounted in a suitable slot or slots in one of the above mentioned pair of jaws so that as the wedge is driven toward the other of the pair of jaws the wedging action occurs. Further, the provision of slots is such that their depth dictates the angle of the plane of engagement of one edge of the wedge with the third jaw. As will be seen, this angle will determine the relationship of the third jaw with the second element to be clamped.



The second element to be clamped might be, for example, the elongated planking disposed externally of the vertically disposed shoring which contains the poured concrete, and thus the wedging action of the present clamping mechanism would provide a movement of such elongated planking relative to the crosshead which carries the clamping mechanism. In a typical application, a pair of clamping mechanisms are mounted to opposite ends of a crosshead, and the shoring to be secured is disposed between the confronting faces of the third jaws of the pair of clamping mechanisms. Then as the wedges of the mechanisms are driven into position the movement of the third jaws will afford a clamping action upon the beam box carried by the crosshead between the pair of clamping mechanisms.

One embodiment of the invention provides an arrangement of jaws for accommodating a wedge therebetween, and which includes a pair of slots for locating with precision the angle of the wedge with respect to the portion of the third jaw which engages the packing or second element. In addition, this embodiment also affords a slidable cooperation between the third jaw and the adjacent one of the other two jaws, which prevents undesirable cocking or rotational movement of the third jaw with respect to the jaw adjacent thereto.

Utilizing the form of clamping mechanism described, it will be apparent that shoring of various widths may be clamped together, and it will also be apparent that the vertical angle of the sides of the shoring may be varied to a certain extent. The clamping mechanism is easily removed by withdrawing the wedge element, and the construction and manner of operation are simple and straightforward.

The illustration and discussion herein of the use of the clamping mechanism in conjunction with the securement of concrete shoring is merely exemplary, and obviously the clamping mechanism is adapted to effect a similar wedging action or relative movement between other pairs of elements, such as for example the sides of a cabinet and an elongated element upon which a pair of the present clamping mechanisms are mounted, the cabinet sides being engaged by the confronting faces of the third jaws of the mechanism to hold the cabinet together for gluing or the like.

Other objects and features of the present invention will be readily apparent to those skilled in the art from the following specification and appended drawings wherein is illustrated a preferred form of the invention, and in which:

Figure 1 is an end elevational view of the clamping mechanism of the present invention mounted in position upon a crosshead or beam, a portion of the shoring or plank also being indicated;

Figure 2 is a perspective view of the clamping mechanism in the position in which it would be mounted to a crosshead, the crosshead being indicated in phantom outline;

Figure 3 is a perspective view of a pair of the present clamping mechanisms mounted upon a crosshead and serving to anchor or secure shoring therebetween;

Figure 4 is a detail view taken along line IV—IV of Figure 2;

Figure 5 is a perspective view of a pair of a modified form of the present clamping mechanism mounted upon a composite form of crosshead and serving to anchor or secure shoring therebetween;

Figure 6 is a perspective view of the clamping mechanism of Figure 5 in the position in which it would be mounted to the composite crosshead, the crosshead being indicated in phantom outline; and

Figure 7 is a view taken along line VII—VII of Figure 6.

Referring to the drawings and more particularly to Figures 1 through 4, there is illustrated an embodiment of the clamping mechanism of the present invention, generally designated 10, which is particularly adapted for mounting upon an element or crosshead 12, which in turn is rigidly mounted to an upright post 14, for the clamping or securement of a shoring assembly 16. As is well known to those skilled in the construction industry or building trades, a plurality of such crossheads 12 are mounted upon a corresponding plurality of upright posts 14 for supporting a comparatively long shoring assembly 16 for the forming of a horizontal concrete beam. The shoring extends transversely of the elongated crossheads and includes base planking 18 forming the bottom of the trough, upright side members 20 defining the sides of the trough, external base element or planking 22 and upright members 24 for strengthening and reinforcing side members 20, and end members (not shown) for closing the ends of the trough. The trough is filled with concrete in the usual manner, and subsequent to the setting or hardening of the concrete the shoring 16 is dis-assembled from the formed concrete beam for re-use. It is an important feature of the present invention that it may be used to clamp or secure such shoring in position with sufficient strength to withstand the weight of the concrete, and yet be adapted to permit simple and quick dis-assembly of the shoring when the concrete has set. As best illustrated in Figure 3, the wedging together of the elements of shoring 16 is best accomplished through the employment of a pair of clamping mechanisms 10, one disposed or mounted at each end of crosshead 12. As will be described in greater detail hereinafter, the action of the pair of clamping mechanisms 10 is such that the elements 22 on either side of upright sides 20 are urged toward each other, and squeeze or wedge the components of shoring assembly 16 together. The clamping mechanisms 10 are rigidly secured, as by means 26 or the like, to element 12 so that the lower portion of mechanism 10 is stationary while the upper portion is movable.

Clamping mechanism 10 comprises a lower or first jaw or body 28 for engaging the under side of element 12, an upper or second jaw 30 for engaging the opposite or upper side of element 12, linkage means for connecting together jaws 28 and 30, a third jaw 34 connected with jaw 30 along the upper side of element 12, and a wedge element 36 disposed between jaws 30 and 34 for producing relative movement between jaws 30 and 34 along the upper side of element 12 and against the latteral edge of the planking or second element 22.

Jaw 28, which is preferably secured to the underside of element 12 by the nails 26, extends laterally or transversely across element 12 and includes depending edge flanges 38. Suitable openings are provided in the pair of edge flanges 38 for carrying a shaft 40. Shaft 40, which forms a part of the linkage means 32, is mounted through the openings provided in flanges 38, and one end of shaft 40 is formed to extend upwardly to one side of jaw 30, and is then again bent or formed to extend transversely above element 12 and parallel to the lower portion of shaft 40 which extends through jaw 28. In addition, the linkage means includes a strap 42 which is provided with an opening at its lower end for mounting thereof upon shaft 40. The assembly of shaft 40 and strap 42 to jaw 28 is maintained by a washer and cotter key arrangement 44, as illustrated. As will be seen, jaws 30 and 34 are mounted to the upper end of strap 42 and to the upper portion of shaft 40 and are movable along the upper surface of element 12, while jaw 28 is fixed in position by reason of its securement to the under side of element 12.

Jaw 30 comprises a substantially rectangular body whose flat sides 46 and 48, top 50, and flat bottom 52 are formed by a continuous wall. The ends of jaw 30 are open as illustrated, and suitable aligned openings are provided in sides 46 and 48 and made large enough so that a pivotal mounting is provided between jaws 30 and 34 whereby the lower surface of flat bottom 52 may be maintained in a planar relationship with the upper surface of element 12 regardless of the position of jaw 30 relative to jaw 28. In addition, the upper wall 50 of jaw 30 is provided with an upwardly opening slot 54, and a laterally offset, forwardly opening slot 56. As will be seen, the slot 54 is adapted to accommodate an upper portion of element 36, and slot 56 is adapted to accommodate a lower portion of element 36. Slot 54 is of greater length or depth than slot 56 whereby the forward edge of element 36 may be located in a predetermined plane for coextensive engagement with third jaw 34.

Jaw 34 is U-shaped or channel-like in configuration and includes a pair of legs 58 and 60, leg 60 being made of a height less than the vertical distance between top 50 and bottom 52 of jaw 30 whereby leg 60 is axially slidable within jaw 30. Legs 58 and 60 are provided with a lost-motion arrangement, taking the form of an axially extending slot 62 provided in each of the legs 58 and 60, for accepting therethrough the upper transverse portion of means 32. Thus, the engagement of the forward and rearward ends of slots 62 provides a limitation of the forward and rearward movement of jaw 34 with respect to jaw 30. In addition, the portion or yoke 64 of jaw 34 is substantially vertical to thereby hold the outer edge of planking 22 in a similar vertical position.

The assembly of jaws 30 and 34 to the upper transverse portion of shaft 40 is maintained by a usual washer and cotter key arrangement 44, as illustrated, and one end of chain 66 is conveniently secured to the cotter key, and the other end of chain 66 is secured to element 36 to prevent inadvertent loss thereof.

Wedge 36 includes opposite edges 68 and 70, which are disposed at an angle to one another, and a pair of side faces 72 and 74, Figure 1, which are engageable with the side edges or shoulders of slots 54 and 56. As will be apparent, a downward driving of element 36, as by a hammer or the like, serves to cause relative movement between jaw 34 and jaw 30, the forward edge 68 of wedge 36 engaging the flat forward surface or wall 64 of jaw 34. This relative movement is first imparted to jaw 30 until further movement is restrained by means 32, and thence the wedging action is borne by jaw 34 and transferred to planking 22.

In operation, therefore, the pair of clamping mechanisms are slidably disposed over the ends of crosshead 12, nails 26 are then employed to secure each jaw 28 in position, and wedge 36 is driven downwardly to effect the desired clamping action.

Referring next to Figures 5 through 7, there is illustrated an alternative embodiment of the invention which is generally designated 76, and which comprises a lower or first jaw 78 which is adapted for disposition adjacent the lower surface of composite crosshead 80; an upper or second jaw 82 which is adapted for disposition adjacent the upper surface of composite crosshead 80; linkage means 84 for connecting together jaws 78 and 82; a third jaw 86 disposed adjacent 82 at the upper surface of crosshead 80, and which is connected to 78; and a wedge element 88 which is adapted for disposition between jaws 82 and 86.

The function of embodiment 76 is broadly similar to that of mechanism 10, and, similar to clamping mechanism 10, preferably employed in pairs, as best illustrated in Figure 5. However, as will be seen, the wedge element 88 is disposed in such a fashion with respect to crosshead 80 that a different type of crosshead 80 is employed. More particularly, crosshead 80 is made up of a pair of beams which are spaced apart by spacers (not shown) a sufficient distance so that the thickness of wedge element 88 may be accommodated therebetween.

As before, crosshead **80** is carried by an upright post **90**, and a plurality of crossheads **80** and posts **90** are arranged along the length of a shoring assembly **16**, as above described in detail.

Jaw **78** is preferably rigidly secured to the underside of crosshead **80**, as by nails **26** or the like, and embodies depending side flanges **92** which are provided with suitable openings for the pivotal accommodation of a transversely disposed lower shaft portion of means **84**.

Jaw **82** embodies a flat main portion which is movable along the upper surface of crosshead **80** and which terminates at its side edges in a pair of upstanding flange elements **96**. These elements **96** embody suitable openings for accommodating the transversely disposed upper shaft portion **98** of means **84**.

Shaft portions **94** and **98** of means **84** are joined at one of their ends by an integral connecting shaft section **100**. The other ends of portions **94** and **98** are pivotally coupled together by a connecting link which is secured in position by any suitable means, such as by cotter keys **104**. Thus, means **84** and the connecting link permit pivotal movement of jaw **82** about portion **98**, and also pivotal movement with respect to jaw **78** whereby jaw **82** may be clamped or snugged against crosshead **80**.

The construction of jaw **86** is similar to that of jaw **82**, and embodies a flat forward face **106** whose edge margins are formed into flanges **108** which embody aligned openings for the accommodation of short pins **110** for pivotally securing the upper ends of a pair of links **112** thereto. The lower ends of links **112** are pivotally connected, as illustrated, to portion **94** adjacent the pair of side flanges **92**.

Wedge **88** is substantially identical to wedge **36** of the previous embodiment, and is adapted to be lodged with its rearward edge located within a forwardly opening slot **114** provided in the forward edge of jaw **82**. The lower end of element **88** is accommodated in the space between the pair of beams of element **80**, and urging of element **88** downwardly will cause the forward edge of element **88** to urge face **106** against planking **22** to effect the desired clamping action.

It will be apparent that the embodiment of Figures 1 through 4 may also be used in conjunction with a composite or split crosshead **80** such as that just described. The wedge element **36** is adapted also to be driven vertically downwardly through the space between the spaced beams making up crosshead **80**, rather than at an angle and to one side of crosshead **80** as described.

From the above description it will be seen that a clamping mechanism has been provided which is adapted to effect a relative movement of one element with respect to another element whereby one of such elements may be clamped against a stationary member or against a similar element which is being acted upon by another clamping mechanism. The clamping mechanism is easy to install, is economical to manufacture, and is easily movable to permit disassembly of the elements being clamped.

While the forms of embodiment herein shown and described constitute preferred forms, it is to be understood that other forms may be adopted falling within the scope of the claims that follow.

I claim:

1. A clamping mechanism comprising, in combination: a first jaw for engaging one side of a longitudinally extending first element; a second jaw for engaging the opposite side of said first element; link means connecting said jaws whereby said second jaw is pivotable in an arc about said first jaw; a third jaw connected with one of the aforementioned jaws and movable along said opposite side for engaging one side of a second element extending substantially transversely across said opposite side of said first element; and a wedge disposed between the second and third jaws for moving said third jaw along said opposite side in a direction substantially parallel to the longitudinal axis of said first element, said wedge having opposite edges and a side face, said third jaw including a surface adapted to be engaged by one of said edges, said second jaw including a portion lying outwardly of the portion thereof which engages said first element, said outwardly lying portion including a shoulder adapted to be engaged by the other of said edges and having a shoulder adapted to be engaged by said side face of said wedge.

2. A clamping mechanism according to claim 1 characterized in that one of the second and third jaws is provided with a slot extending along the direction of movement of said third jaw, and that a pin extends through said slot and is connected with the other of said second and third jaws.

3. A clamping mechanism comprising, in combination, a first jaw for engaging one side of a longitudinally extending first element; a second jaw for engaging the opposite side of said first element; first link means connecting said first jaw and said second jaw whereby said second jaw is pivotable in an arc about said first jaw; a third jaw having a flat surface for engaging one side of a second element extending substantially transversely across said opposite side of said first element, and having an opposite force receiving surface; second link means connecting said first jaw and said third jaw whereby said third jaw is pivotable in an arc about said first jaw, said third jaw being pivotally connected to said second link means whereby said flat surface of said third jaw is alignable with said one side of said second element; and a wedge disposed between the second and third jaws for moving said third jaw along said opposite side of said first element and toward said one side of said second element, said wedge having opposite edges, said second jaw having a slot therein for receiving one edge of said wedge whereby said wedge engages the force receiving surface of said third jaw and the bottom of said slot with its opposite edges to urge apart said second jaw and said third jaw.



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