

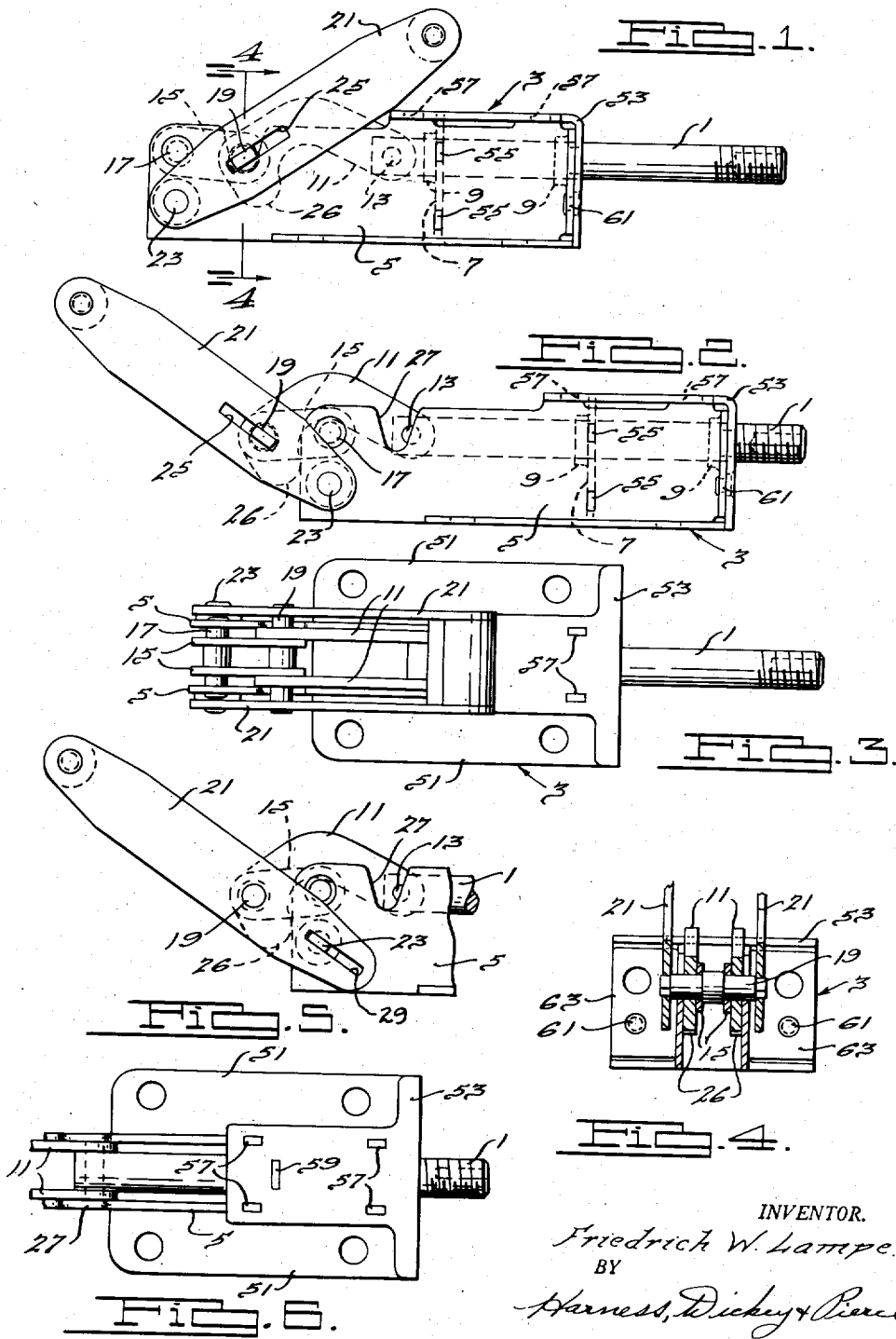
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TOGGLE CLAMP

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TOGGLE CLAMP

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This invention relates to linkage systems and in particular refers to clamping devices.

The major object of the invention is to provide a clamping device of the toggle type in which a member can be locked in two different positions by movement past dead center, with less than 180° movement of the handle and without resetting the handle.

A further object is to provide a device for the purpose set forth which has few parts and is economical to manufacture, but which is rugged and efficient in operation.

A preferred embodiment is shown in the accompanying drawings to illustrate the principles of the invention wherein:

Figure 1 is a side elevation of a toggle clamp constructed in accordance with the principles of the invention;

Fig. 2 is a side elevation of the device of Fig. 1, showing it in a different position;

Fig. 3 is a plan view of the device shown in Fig. 1;

Fig. 4 is a section taken on line 4-4 of Fig. 1;

Fig. 5 is a side elevation with parts broken away of a modified form of the invention; and

Fig. 6 is a plan view similar to Fig. 3 with parts broken away.

In the embodiment selected to illustrate the principles of the invention, a reciprocatory rod member 1 is slidably carried by a frame structure 3. The frame may be of any design suitable for the purpose for which the clamp is to be used, but is preferably formed as hereinafter described. It includes longitudinal side plates 5 connected by transverse web sections 7 which have bushings or extrusions 9 in which the rod 1 is mounted. A pair of bow-links 11 are pivoted at 13 to the inner end of the rod 1 and are thus slidably moved therewith. As shown in the drawings, the bow-links are arched to present a concave side facing the rod 1. A pair of guide links 15 are pivoted at 17 to the side plates 5 and the axis of this pivot connection preferably intersects the extended axis of the rod 1. The other ends of the guide links 15 are thus constrained to move in circles about the axis of pivot connection 17 and these ends of the guide links 15 are pivoted at 19 to the ends of the bow-links so that the latter must also move about the axis of pivot 17.

In normal usage, the rod 1 will be attached to an object to be moved (not shown) and movement is effected through the linkage described by means of a handle lever 21. This lever may include a pair of side arms which are pivoted to the side plates 5 at 23 and have slots 25 which

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receive the pivot pin 19 whereby the latter may be moved about the pivot 17 as previously mentioned. This movement of the pin 19 is transmitted through the bow-links 11 to slide the rod 1 in the direction in which the handle 21 is moved. When the handle 21 is moved to the left, the arched construction of the bow-links 11 permits the axis of pivot connection 19 to drop on or below a plane through the axes of pivot connections 17 and 13, i. e., beyond dead center and provide locking before the concave undersides thereof engage the pivot pins 17 as shown in Fig. 2 to prevent further movement. In this position the rod 1 is withdrawn into the frame 3 and positively held there since axial forces are not able to raise the pivot 19 above dead center. As the lever 21 is moved toward the right, the pivot 19 circles about the pivot 17 and passes beyond dead center on the opposite side thereof as shown in Fig. 1. It may be noted that ears 26 on the links 11 always remain within the side plates 5 during this movement and thereby prevent jamming due to possible transverse movement of the pair of bow links. The movement beyond dead center is permitted but also limited by slots 27 in the side plates 5 which receive the pivot pin 19. It will be recognized that axial forces on the rod when the pivot connection 19 is in this position are not capable of moving the linkage so that the rod is locked in the extreme outward position.

It is to be especially noted that since the handle 21 is pivoted about its own independent pivot 23 instead of pivot 17, less than 180° movement is required to lock the rod 1 in either of its extreme positions. As shown in Fig. 5, this result can also be achieved by pivoting the handle 21 to the pivot 19 and by slotting its connection with the pivot 23 as shown at 29. If it is desired to have the rod 1 move in a direction opposite to the handle, this can be achieved by placing the pivot 23 above the pivot 17.

The frame 3 is preferably constructed in accordance with details that are best shown in Figs. 1, 2 and 6. It includes the parallel side plates 5 which may have lateral bottom flanges 51 for attachment to a table or the like. The linkage is connected to the frame members 5 by the pivot pin 17 and the rod 1 is supported on the frame members 5 through the medium of extrusions 9 formed in the web 7 and the angle shaped cover and front plate 53. The web 7 is supported on the side plates 5 by pairs of lateral tabs 55 which fit in suitable receiving slots in the side plates. The angle plate 53 rests, of course, on the top

edges of the side plates and it is adapted to prevent lateral relative movement of the side plates, thus assisting the pivot 23 and handle 21 which also performs this function. This is accomplished by the pairs of upright tabs 57 on the side plates which fit in suitable slots in the angle plate 53. The web 7 is also attached to the angle plate 53 by means of a tab and slot connection 59. Assembly of the frame members is permitted by a slight resiliency of the top of the angle plate 53 and once the tab and slot connections are established, the toggle clamp is securely assembled, no permanent connection such as rivets, nuts and bolts or welds being required to hold the assembly together. However, since there may be relative movement of the frame parts, tending to bind the rod 1, the front of the plate 53 may be riveted at 61 to side flanges 63 on the side members 5 to prevent such movement, and in addition all tabs may be peened.

By virtue of the construction shown it will now be realized that the rod 1 may be locked in either of two axial positions with a handle movement of less than 180° and without resetting of the handle. It will be apparent that the principles of the invention as exemplified above may be embodied in other constructions, hence it is not intended to limit the invention to the specific construction described.

What is claimed is:

1. In a toggle clamp, the combination of a reciprocatory member, a guide link having a fixed first pivot connection, a bow-link having a second pivot connection with the member and a third pivot connection with the guide link and having a concave side facing the plane defined by the axes of the first and second pivot connections, and a lever having a fourth pivot and operatively secured to the third pivot connection for reciprocating the member into locked positions at opposite ends of its stroke with less than 180° movement of the lever.

2. In a toggle clamp, the combination of a reciprocatory member, a guide link having a fixed first pivot connection, a bow link having a second pivot connection with the member and a third pivot connection with the guide link and having a concave side facing the plane defined by the axes of the first and second pivot connections, means for limiting movement of the third pivot connection beyond the face of the plane opposite said bow-link, and a lever movable about a fourth pivot operatively attached to the third pivot connection for moving the member into locked positions at opposite ends of its stroke wherein the third pivot is beyond dead center, said lever movement being less than 180°.

3. A two-way toggle clamp comprising a frame, a reciprocatory member mounted on the frame, a bow-shaped link having a pivoted drive connection at one end with the member, a guide link pivoted at one end to the frame about a fixed axis lying substantially in a plane through the reciprocatory axis of the member and normal to the plane of the bow link and rearwardly of the pivot connection between the bow link and member, a first pivot connection between the other end of the guide link and the other end of the

bow link whereby said last end of the bow link is confined to travel in a predetermined circular path about the fixed axis as a center and a central portion of the bow link bearing upon the pivot connection at the fixed axis may serve to limit rotary travel of the other end of the bow link in an outward direction, means providing a second pivot connection on the frame spaced from the first, and a lever having a non-slidable connection with one of said two pivot connections and a slidable connection with the other whereby less than 180° movement of the lever is capable of moving the first pivot connection beyond dead center in either direction.

4. In a toggle clamp, the combination of a reciprocatory member, a guide link having a fixed pivot, a connector link pivoted to the member and having a first pivot connection with the guide link, said connector link being constructed and arranged to permit movement of the first pivot connection over the fixed pivot and beyond dead center on either side thereof, means providing a second pivot connection, and a lever having a slidable connection with one of said two pivot connections and a non-slidable connection with the other whereby less than 180° movement of the lever is required to move the first pivot connection to dead center positions on opposite sides of the fixed pivot.

5. A toggle clamp comprising a pair of laterally spaced elongated upright side plates, an angle plate providing a top cover and a front cover for the side plates, longitudinally spaced upright tabs on the top edge of the side plates, said cover having slots receiving said tabs, a lateral web fitting between the plates and spaced rearwardly from the front cover, spaced lateral tabs on the web, said side plates having slots receiving said web tabs, means providing aligned apertures in the web and front cover, a rod slidably mounted in the web and cover and extending through the apertures, arched links pivoted to both sides of the rod, a guide link having a pivot connection with the side plates, said pivot connection being on the concave side of the arched links, means pivotally connecting the other ends of the arched links and the guide link, said means being movable across the axis of the rod on both sides of said pivotal connection whereby said rod may be locked in extreme forward or rear positions, a handle having a pivot connection with the side members and with the last means, and slot means whereby said handle is capable of longitudinal movement relative to one of its two mentioned pivot connections.

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