Dec. 10, 1957 A. IRAIDS 2,815,777

SPRING ACTUATED MITER CLAMP

Filed Nov. 23, 1954

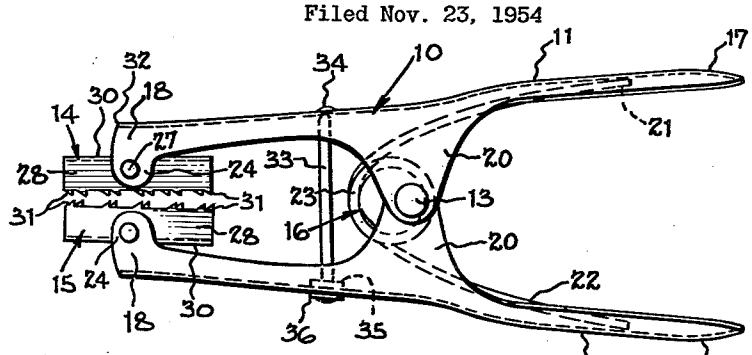


Fig. 1

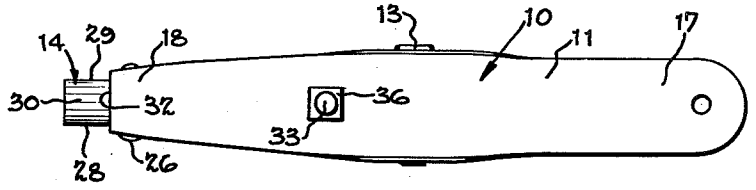


Fig. 2

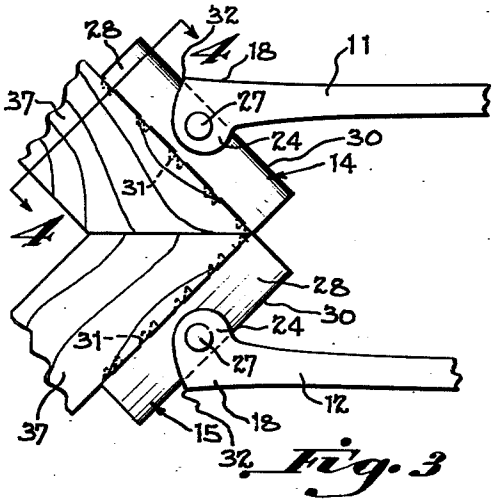


Fig. 3

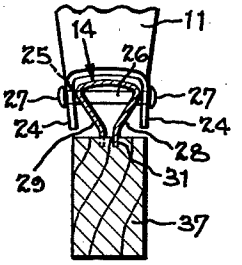


Fig. 4

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United States Patent Office

2,815,777

Patented Dec. 10, 1957

2,815,777

SPRING ACTUATED MITER CLAMP

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Application November 23, 1954, Serial No. 470,690

1 Claim. (Cl. 144—293)

The present invention relates to clamps and is particularly directed to a spring hand clamp having pivoted jaws.

The principal object of the present invention is to provide a spring hand clamp for applying clamping pressure to workpieces presenting sides which are angulated with respect to one another. For example, in cabinet making it is continually necessary to clamp together two panels forming a right angle corner joint.

Heretofore, various types of clamping arrangements have been suggested for clamping pieces at right angles. For example, various types of rectangular miter clamps have been proposed. These clamps are not completely satisfactory for several reasons. In the first place, conventional miter clamps are unwieldy and are difficult to apply to the work. Moreover, since miter clamps include four members which completely encompass the work, the size of pieces upon which the clamps can be used is inherently limited. In addition miter clamps cannot readily be used to join panels forming acute angles.

The present invention is predicated upon the concept of providing a hand clamp which is provided with pivotally mounted jaw members adapted to facially engage and grip surfaces disposed at any angle relative to one another. More specifically, a clamp constructed in accordance with the present invention comprises two arms which are pivotally secured together at a point intermediate their ends. One end of each of the arms serves as a handle end, while the opposite end functions as a clamping end. A spring is compressed between the handle ends of the arms and functions to urge the clamping ends of the arms toward one another. The clamping end of each of the arms carries a work engaging jaw which is pivotally secured to the end of the arm. In the preferred embodiment, each work engaging jaw presents two parallel rows of teeth which bite into the work to hold the clamp firmly in place. These jaws are free to pivot and thereby automatically conform themselves to the angulation of the workpieces being clamped. Thus, if two workpieces forming a right angle corner are being joined, the jaws automatically pivot so that a 90° angle is formed between them, and each of the jaws resides in facial engagement with one of the surfaces being clamped.

One of the principal advantages of the present clamp is that it is extremely easy to apply. An operator can hold the two pieces being joined in position with one hand, and by compressing the handle ends of the clamp arms can open the jaws to receive the work. When the jaws are brought into contact with the workpieces, the jaws automatically pivot to exactly the right position for engagement with the surfaces being clamped. After the clamp has been positioned, the handle ends are released and the teeth bite into the surfaces to hold the clamp in place. The clamp can be left in this position indefinitely and the pieces will be held firmly together by the spring tension applied to the clamp arms.

Another advantage of the present clamp is that it is extremely effective in clamping workpieces together irrespective of the angle at which the pieces are joined. The pivotally mounted jaws are adapted to facially engage the angulated work surfaces so that the pressure applied to the work is distributed over the length of the clamping jaw and is directed normal to the work. Moreover, the teeth provided in the jaw prevent the clamp from gradually slipping from the workpiece.

A still further advantage of the present clamp is that it is adapted to be used on any size work so that it is unnecessary to maintain a stock of different sized clamps for each different size of article to be made.

A still further advantage of the present clamp is that while the clamp is extremely versatile, it can be economically manufactured. The clamp differs from a simple, conventional spring hand clamp only in the provision of hinged jaw members which are readily machined and easily assembled with the handles by means of a rivet or other member. Consequently, the present clamp costs relatively little more than a conventional hand clamp, but is substantially more useful since it not only can be used to clamp parallel pieces but also members disposed at any angle.

These and other advantages of the present invention will be apparent from a consideration of the following detailed description of the drawings illustrating a preferred embodiment of the invention.

In the drawings:

Figure 1 is a side elevational view of a clamp constructed in accordance with the present invention.

Figure 2 is a bottom view of the clamp.

Figure 3 is a partial enlarged view of the clamping jaws showing the manner in which the jaws are applied to a mitered corner.

Figure 4 is a cross sectional view taken along line 4—4 of Figure 3.

A preferred form of clamp **10** constructed in accordance with the present invention is shown in Figure 1. Generally, clamp **10** comprises two lever arms **11** and **12**, pivotally joined intermediate their ends, a pair of work engaging jaws **14** and **15** mounted on the lever arms, and a spring **16** for urging the jaws into their closed position.

More specifically, each lever arm **11** is preferably of arcuate cross section and includes a handle end **17**, a clamping or jaw end **18** and two flanges **20—20** formed on the central portion of the handle. The flanges formed on handle **12** are nested within the corresponding flanges of handle **11**, each of the flanges being provided with an opening for receiving pivot pin **13**. This pin passes through the flange openings and its ends are overturned to permanently hold the arms in their assembled position.

Spring **16** includes two extensions **21** and **22** which engage the inner surfaces of lever arm handle ends **17**. The spring also includes one or more coil segments **23** surrounding pin **13**. Extensions **21** and **22** are effective to transmit the compressive force of the spring to the handles causing the jaws **14** and **15** to converge and apply pressure to workpieces disposed between them.

The jaw end **18** of each of the arms is provided with a pair of spaced ears **24**. Aligned openings **25** are formed in the ears carried by each jaw and a pivot pin **26**, preferably having overturned ends **27**, is inserted through each pair of openings. Each pivot pin rotatably carries one of the jaw clamping elements **14** and **15**.

In the embodiment shown, each jaw is constituted by an elongated sheet steel member having a generally U-shaped configuration. Each jaw includes two arms **28** and **29** and a curved back portion **30**. The ends of arms **28** and **29** extend in parallel juxtaposition to one another and are provided with a plurality of serrations, or teeth **31**. The size of the teeth is not critical; however, one suitable form of a tooth is approximately 1/16 of an inch high and 1/16 of an inch wide at its base. Each tooth is preferably of

right triangular configuration, including one edge, nearest the inner end of the jaw, extending perpendicular to the line of teeth and a sloping side facing the outer end of the jaw. In the preferred embodiment, the teeth, formed on opposite arms **28** and **29**, are staggered with respect to one another. This has been found to provide an improved gripping action when the clamp is applied to certain surfaces. The curved, back portion **30** of the jaws are preferably of substantially the same width as the spacing between ears **24**. Aligned openings are formed in the arms adjacent to this curved portion for receiving pivot pins **26**.

The clamping elements are free to pivot about pins **26** from a position in which the elements are parallel as shown in Figure 1 to a position in which the elements are disposed at right angles to one another as shown in Figure 3. It will readily be appreciated that the clamping elements are also readily disposed at any angle less than a right angle; and that in addition, if the edges **32** of the clamping arms are shortened relative to ears **24**, the jaws can be pivoted to accommodate workpieces having faces at oblique angles to one another.

The clamp construction is completed by an elongated stop bar **33** secured to one of the arms intermediate its jaw and pivot pin **13**; and extending across the space between the arms into engagement with a detent **34** formed in the opposite arm. The function of the stop pin is to prevent the clamping elements from being brought together under pressure unless a workpiece is placed between them. The stop pin may be secured to arm **12** in any convenient manner such as by spot welding or by nuts **35** and **36** on opposite surfaces of the arm.

When using a clamp of the present type, the operator brings the workpieces together in the position in which they are to be glued or otherwise joined. He then presses the two handle ends **17** together, separating jaws **14** and **15**. The clamp is then advanced toward the work so that the corner of the workpiece enters the outer ends of the jaws. The jaws, which freely pivot around pins **26**, automatically conform to the angle between the panels **37**. The clamp is preferably positioned so that all of the teeth of each of the jaws engage the panels as shown in Figure 3. The clamp handles are then released and spring **16** forces the jaw elements firmly against the panel members. Teeth **31** bite into the wood to prevent the jaws from slipping from the work. The clamp may be left for an indefinite period while the glue or other mastic sets. Finally, the clamp is removed from the work by pressing handles **11** and **12** to separate jaws **14** and **15**. The slight indentations formed in the wood by teeth **31** are removed when the work is given its final sanding prior to finishing.

It will readily be appreciated that the clamp of the present invention can be used on work presenting various angles other than a right angle. The jaws automatically pivot so that their rows of teeth facially abut the surfaces of the pieces being clamped. Thus the maximum available clamping pressure is effectively applied to the work. Also, the biting action of the teeth into the wood or other material holds the clamp firmly in place.

From the above discussion of the general principles of the present invention, and the foregoing detailed description of the drawings, those skilled in the art will readily comprehend the various modifications to which my invention is susceptible. For example, while I have shown a spring having an elongated extension for applying the pressure to converge the jaws, this spring could be replaced by a coil spring compressed between handle **17—17** of the lever arms.

It will also be understood that while the clamp has been described in conjunction with the clamping of planar pieces, it also has great utility for clamping mitered corners of irregular shaped members such as molding strips. When clamping such irregular shaped pieces, the gripping action of the teeth insures that the clamp will not slip off the work.

Having described my invention, I claim:

A clamp comprising two arms, each of said arms having a clamping end and a handle end, means pivotally connecting said arms intermediate the ends thereof, work engaging jaws pivotally connected to the clamping end of each of said arms, each of said work engaging jaws being of substantial length and each comprising an elongated metal sheet bent in a substantial U-shaped configuration, two elongated edges of said sheet being disposed parallel to one another and each being provided with a row of teeth disposed for engagement with the work, each of said teeth including a sloping edge facing the outer end of said jaw and a face substantially perpendicular to said elongated edges of the jaws and facing the inner end of said jaw, and spring means for converging the clamping ends of said handles.

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