STRAIGHT BEAM CLAMP WITH ADJUSTABLE SELF-LOCKING JAW

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Attys
This invention relates to clamps and more particularly to clamps of the character wherein both jaws thereof are adjustable toward and away from each other.

Clamps wherein both jaws thereof are adjustable toward and away from each other are, for the most part, relatively old in the art. However, it is a primary object of my invention to afford a clamp wherein the jaws thereof may be adjusted relative to each other in a novel and expeditious manner.

It is another object of my invention to construct a clamp which includes a jaw embodying a novel quick release device for securely holding the jaw in position when a work piece is clamping. This quick release device may be quickly and easily released from holding position when it is desired to move or adjust the position of the slideable jaw.

A further object of my invention is to provide a clamp wherein the individual parts thereof may be readily constructed by relatively simple operations and may be assembled together in a novel and expeditious manner.

Yet another object of my invention is to provide a clamp of the aforesaid character which may be readily and economically manufactured commercially in a novel and practical manner.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments and the principles thereof and what I now consider to be the best mode in which I have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a side elevational view of a clamp embodying the principles of my invention;

Fig. 2 is a detail view of a portion of the clamp shown in Fig. 1, showing certain parts as they appear at one stage of the assembling of the clamp;

Fig. 3 is a sectional view taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a sectional view taken substantially along the line 4—4 in Fig. 1;

Fig. 5 is a sectional view taken substantially along the line 5—5 in Fig. 1;

Fig. 6 is an elevational view of a part of the clamp shown in Fig. 1, but showing the parts thereof in a different operational position;

Fig. 7 is a side elevational view of a modified form of my invention;

Fig. 8 is an elevational view similar to Fig. 7 showing a part of the clamp in a different operational position;

Fig. 9 is a detail sectional view taken substantially along the line 9—9 in Fig. 7; and

Fig. 10 is a detail sectional view taken substantially along the line 10—10 in Fig. 7.

The clamp 20, shown in Figs. 1 to 6, inclusive of the drawings to illustrate to a preferred embodiment of my invention, comprises an elongated body member 22 on which are movably mounted two slides 24 and 26 comprising the clamping elements of my device.

The body member 22 may be constructed in any suitable shape and form but I prefer to construct it of a steel or iron pipe member having a circular-shaped cross section and having threads 28 formed on one end thereof. A collar member 30 having internal threads formed therein is mounted on the aforesaid end of the body member 22 and is held thereon by engagement with the threads 28.

A nut 32 comprising two internally threaded members 34 and 35 is attached to one side of the collar member 30 by welding 31, the members 34 and 35 being welded together along a line 38 to form the nut 32.

The slide member 26 comprises a substantially rectangular shaped plate having an opening 40 formed therein which is slightly larger than the outer diameter of the body member 22. A feed screw 42 extends through and is operatively engaged with the nut 32. A crank 44, having a handle 46 thereon, is mounted on one end portion of the feed screw 42 to afford means for turning the feed screw and thereby cause the feed screw 42 to be moved longitudinally through the nut 32.

The other end of the feed screw 42 is connected to the slide member 26 by a ball and socket joint, the ball 48 being provided on this latter end of the screw 42, and the socket being provided by a boss 49 formed on the slide member 26 and having an opening 50 formed therefor.

In the construction and assembly of my novel device, the side walls of the boss 49 and of the opening 50 are originally formed substantially straight, as best seen in Fig. 2, and with these side walls in this position the ball 48 is inserted.
The end portion of the slide 26 on which the boss 49 is formed affords a jaw 54 which is positioned opposite a corresponding jaw 58 embodied in the slide 24. The two jaws 54 and 56 comprise the work-engaging members between which work pieces are held in the operation of the clamp 20.

The jaw member 56 of the slide 24 is supported on the body member 22 by a substantially U-shaped hanger 60 which comprises two substantially parallel arms 62 and 64 connected together at one end by a cross bar or gripping member 55 connected therewith by suitable means such as a rivet 69, Fig. 3. As best seen in Figs. 1 and 3, the jaw member 65 is substantially T-shaped having a web portion 72 and a cross bar 73, the cross bar portion 73 being formed on that end of the jaw member 56 which faces the jaw member 58 and thereby affords the work-engaging portion of the jaw 56.

The ends of the arms 62 and 64, comprising the open end portion of the hanger member 60, are pivotally connected to the web 72 of the jaw 56 by suitable means such as a rivet 75.

An opening 71 is formed in the web portion 72 of the jaw 56 on the opposite side of the arms 62 and 64 from the slide 26, and a suitable spring member, such as a coil spring 80 having outwardly extending ears 81 and 82 formed thereon, is mounted in the opening 71 with the ears 81 and 82 engaged with the adjacent edge portions of the arms 62 and 64, respectively, so that the spring 82 urges the hanger member 60 to pivot on the rivet 75 in a clockwise direction, as viewed in Fig. 1, and thereby urges the gripping member 55 into engagement with the body member 22. Thus, when the slide 24 is in normal position on the body member 22, the arms 62 and 64 are positioned at an obtuse angle to the longitudinal axis of the body member 22 with the gripping member 55 positioned closer to the jaw 54 than is the rivet 75, and the spring 80 is effective to hold the jaw 54 against the body member 22 to thereby yieldingly grip between the gripping member 55 and the end portions 84 and 86 of one side of the jaw 56, the intermediate portion 87 of the side of the jaw 56, between the end portions 84 and 86, being cut away as is best seen in Figs. 1 and 6.

With this construction, when a force is applied to the jaw 56 in a direction away from the body member 22, such as, for example, when a work piece is clamping engaged between the jaws 54 and 56, the gripping member 65, through its frictional engagement with the body member 22, resists such force applied to the jaw 56. As a result, the force tends to move the jaw 56 relative to the gripping member 65 and thereby causes the arms 62 and 64 to pivot in a clockwise direction on the rivet 75, as viewed in Fig. 1, to thereby press the gripping member 65 into even tighter gripping engagement with the body member 22 and hold the slide 24 in stationary position on the body member 22. Thus it will be seen that the slide 24 affords a clamping element which is substantially self-actuated in gripping the body member 22 when a force is applied in a clamping direction on the jaw 56. The gripping member 65 may be constructed of any suitable material, such as for example, wrought iron, and, to afford relatively good frictional characteristics between the gripping member 65 and the body member 22, the inner face of the gripping member 65, which is complementary to the outer surface of the body member 22, may have transversely extending grooves 89 formed therein as is best seen in Figs. 1 and 6.

In the operation of a clamp such as the clamp 20 shown in the accompanying drawings, it is often desirable to make the rough adjustments of the positions of jaws 54 and 56 relative to each other by moving the jaw 56. Such adjustments may be quickly and easily made with my novel clamp. Thus, for example, it will be seen that if it is desired to move the slide 24 away from the slide 26, this may be readily accomplished by pressing on the cross bar 65 in a direction away from the slide 26. The force thus applied to the cross bar 65 is effective to swing the arms 63 and 64 in a counter-clockwise direction, as viewed in Fig. 1, against the urging of the spring 80 to thereby raise the gripping member 65 out of engagement with the body member 22 to permit the slide 24 to be moved away from the slide 26 as shown in Fig. 8. If, on the other hand, it is desired to move the slide 24 toward the slide 26, this may be readily accomplished by pressing on the jaw member 56 in a direction toward the slide 26, the force thus applied in this direction on the jaw 56 being effective to also turn the arms 62 and 64 in a counter-clockwise direction, as viewed in Fig. 1, to thereby release the gripping member 65 from engagement with the body member 22.

From the foregoing it will be seen that I have provided a novel clamp wherein one jaw thereof is frictionally held in a predetermined position on the body member of the clamp when the clamp is being used to hold a work piece, but which jaw embodies novel and easily adapted mechanism which may be quickly and easily adapted to thereby release the jaw for sliding movement along the body member when it is desired to adjust the position of the jaw.

Furthermore, it will be seen that I have provided a novel clamp wherein the various parts thereof comprise structural members which may be readily constructed and which may be quickly and easily assembled in a novel and expedientious manner in the manufacture of my novel clamp.

Modified form of clamp shown in Figs. 7 to 10, inclusive.

In Figs. 7 to 10, inclusive, is shown a modified form of my invention. Many of the parts embodied in the modified form of my invention are similar to the parts shown in Figs. 1 to 6, inclusive, and are indicated by the same reference numerals with the suffix "a" added thereto.

The clamp 28a, like the clamp 20, comprises a body member 122 and two slides 124 and 126 mounted thereon. A feed screw 43a is operatively mounted in a nut 32a suspended from one end portion of the body member 120 and operable to move the slide 126 toward and away from the slide 124.

The body member 122, as best seen in Figs. 7 and 9, comprises a substantially flat rectangular shaped bar of suitable material, such as, wrought
iron, and has a series of spaced grooves or indentations 123 formed in one edge portion 125 thereof.

The slide 124 comprises two side plates 162 and 163 mounted on opposite sides of the body member 122. The side plates 162 and 163 are connected together at one end portion by a cross bar 165 which is suitably attached thereto such as by welding 166 and is adapted to rest on the edge 125 of the body member 122. The side plates 162 and 163 are connected together at the other end by a cross plate 164 which is likewise suitably attached thereto by welding 168.

The cross rod 165 is adapted to engage the edge 125 of the body member 122 and is complementary in shape to the indentations 123 formed therein. The crossbar 164 is adapted to engage the edge of the body member 122 opposite the edge 125, as best seen in Fig. 7.

A substantially rectangular shaped plate member 173 is connected to the side plates 162 and 163 and the cross rod 165 by the welding 168. The plate member 173 has a slot 174 formed therein, Fig. 5, and is mounted on the body member 122 with the body member 122 disposed in the slot 174.

A substantially cylindrical-shaped opening 391 is formed in the cross member 172 adjacent to and in alignment with, the slot 174, and a pin 303 having a head 304 on one end thereof is mounted in the opening 391 for reciprocation therein. A coil spring 306 is mounted in the opening 391 around the pin 303 and urges the pin 303 inwardly against the edge 127 of the body member 122, to thereby urge the slide 124 to rotate in a clockwise direction, as viewed in Fig. 7, around the cross rod 165 and thereby yieldingly maintain the cross rod 165 and the cross member 173 in engagement with the edges 125 and 127 of the body member 122, respectively.

The slide 126, like the slide 124, includes a cross member 308 having a slot 310 formed therein and is mounted on the body member 122 with the body member engaged in the slot 310, Figs. 7 and 10. A crossbar 312 is attached to the cross member 308 by welding 314 and extends across the open end of the slot 310. The crossbar 312 is adapted to engage the edge 125 of the body member 22a to thereby support the slide 126 therefrom and maintain the inner end portion of the slot 310 in engagement with the edge 127 of the body member 122.

The cross members 173 and 308 of the slides 124 and 126 afford jaws 56a and 54a, respectively, which comprise the clamping elements of the clamp 20a.

In the operation of the clamp 20a the slide 124 is first adjusted to the desired position on the body member 22a. This is accomplished by tilting the slide 124 in a counter-clockwise direction, as viewed in Fig. 7, about the cross plate 184 and against the urging of the spring 305 to thereby raise the cross rod 165 out of engagement with the body member 122. The slide 124 may then be moved along the body member 122 to the desired position wherein the cross rod 165 is in alignment with a corresponding indentation 123 and the slide 124 may then be released to permit the spring 305 to rotate the slide in a clockwise direction about the cross rod 164 and move the cross rod 165 into engagement with the aforesaid corresponding indentation 123. It will be seen that the engagement of the cross rod 165 in the indentations 123 tends to restrain the slide 124 from movement longitudinally along the body member 122.

When a work piece is being clamped between jaws 56a and 54a, a considerable force is applied to the jaw 56a in a direction away from the jaw 54a. When such force is applied to jaw 56a, the engagement of the rod 165 in the indentations 123 tends to restrain the slide 124 from moving away from the slide 126 and, therefore, the slide 124 tends to rotate around the cross rod 165 in a clockwise direction, as viewed in Fig. 7, to thereby firmly grip the body member 122 between the cross member 184 and the cross rod 165. Thus, it will be seen that upon application of a clamping force between the jaws 56a and 54a the slide 124 is firmly and positively held in position on the body member 122.

However, when it is desired to adjust the position of the slide 124 on the body member 122, this may be easily accomplished by first releasing the pressure of the jaw 54a on the jaw 56a, then raising the cross rod 165 out of engagement with the indentations 123, as previously discussed; and then moving the slide 124 along the body member 22a to the desired position.

If desired, a suitable abutment, such as, for example, a pin 316 may be mounted on the body member 122 at the end opposite the nut 32a to thereby prevent the slide 124 from being accidentally dislodged from the body member 22a when the clamp 20a is being stored or transported.

From the foregoing it will be seen that I have provided a novel clamp of the aforementioned character wherein the jaws thereof may be quickly and easily adjusted relatively to each other in a novel and expeditious manner and wherein the jaws are firmly and positively held in position when the clamp is being used to hold a work piece.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A clamp comprising a tubular-shaped body member having a collar member screwed onto one end thereof, two clamping elements mounted on said body member and movable longitudinally thereof toward and away from each other, one of said clamping elements comprising an elongated jaw member having an opening formed therein, said jaw member being mounted on said body member with a portion thereof projecting from one side of said body member and with said body member disposed in said opening, the other of said clamping elements comprising another elongated member having one end engaged with said one side of said body member, an elongated web member having one end welded to the central portion of said other elongated member and projecting transversely thereto and longitudinally along said body member in a direction away from said jaw member, said web member having a recess in the edge thereof that is next to said body member and extending from said one end thereof rearwardly to provide an engagement portion formed on the end thereof opposite said one end and engaged with said one side of said body member, two elongated arms pivotally connected at one end to said web member between
said abutment portion and said other elongated member, said two arms being disposed on opposite sides of said body member, a gripping cross member pivotally mounted between the other ends of said arms, and a coil spring mounted in said web member and having end portions projecting therefrom into engagement with side portions of said arms, said spring urging said arms to pivot on said web member toward said jaw member and thereby urging said gripping cross member into engagement with the side of said body member opposite said one side to thereby yieldingly grip said body member between said cross bar and said other elongated member and said abutment member, and means including a feed screw mounted in said collar member and connected to said jaw member for moving said jaw member toward and away from said other elongated member.

2. A clamping device comprising an elongated tubular body member, two clamping elements mounted on said body member and movable therealong toward and away from each other, one of said clamping elements comprising a jaw member bodily movable into and out of engagement with one side of the body member, said jaw member having a recess in the side thereof next to the said one side of the member whereby there are afforded two abutments at either end of the recess, said abutments being spaced from each other longitudinally of said body member to thereby be engageable with said body member at corresponding spaced apart points, an elongated hanger member comprising a pair of arms straddling said body member with one end portion of each arm pivotally connected to said jaw member between the said two abutments, the other end portion of each arm extending over the side of said body member opposite the said one side thereof, a gripping cross member mounted between said other end portions of said arms to engage said opposite side of the body member, and a coil spring mounted in said jaw member with opposite ends thereof engaging said arms just above the pivot thereof to cause the hanger to pivot on said jaw member toward the other of said clamping elements to thereby yieldingly hold said abutment members and said gripping cross member in engagement with the respective sides of said body member, said gripping cross member, when so engaged with said body member, being positioned closer than said one end portion of said hanger member to said other clamping element to thereby permit either the jaw member or the gripping cross member to be yieldingly disengaged from said tubular body member to allow said one clamping element to be moved bodily along the tubular member in one direction or the other, and means mounted on said body member for moving said other clamping element toward and away from said one clamping element.

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