

[54] CLAMP

[76] Inventor: Christopher P. Emerson, 405 E. Main, Lamoni, Iowa 50140

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[58] Field of Search 24/248 A, 248 L, 248 SA, 24/248 BC, 248 R; 269/88, 208, 238, 209

[56]

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Primary Examiner—Bernard A. Gelak

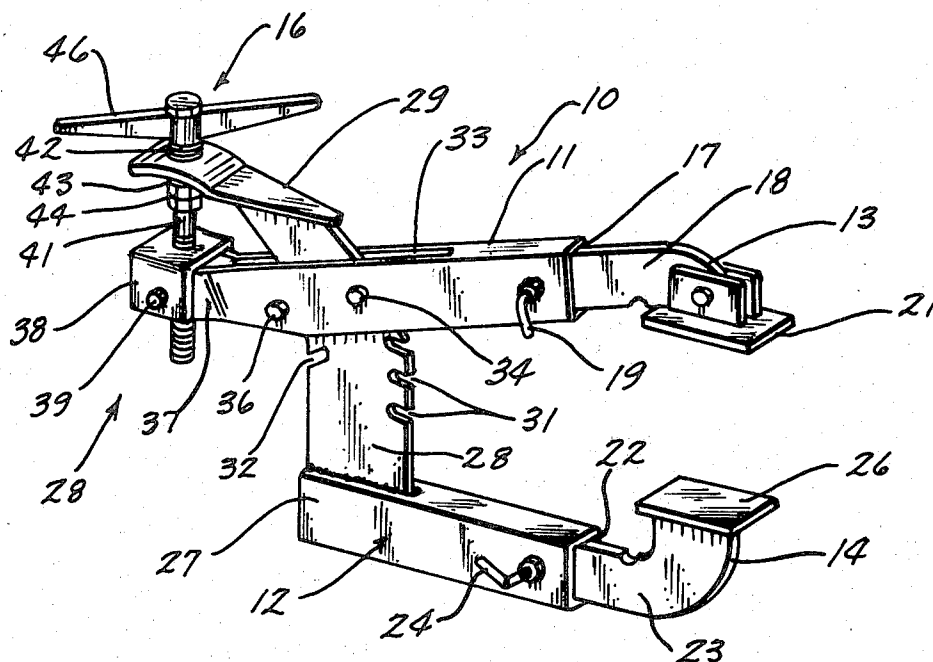
Attorney, Agent, or Firm—Henderson & Strom

[57]

ABSTRACT

A clamp having a pair of clamp arms pivotally connected intermediate the ends thereof. A novel construction allows the pivotal point to be changed, thereby producing a versatile clamp which can have slow action and a high leverage factor, a fast action and a slow leverage factor or adjustments inbetween. The length of the clamp arms are additionally adjustable. A jack screw device extends through a hole in an arcuate shaped member in one of the clamp arm ends and threadedly engages a pivotally mounted bracket on the other clamp arm in a construction which allows the movement of the pivotal point on the clamp.

9 Claims, 5 Drawing Figures



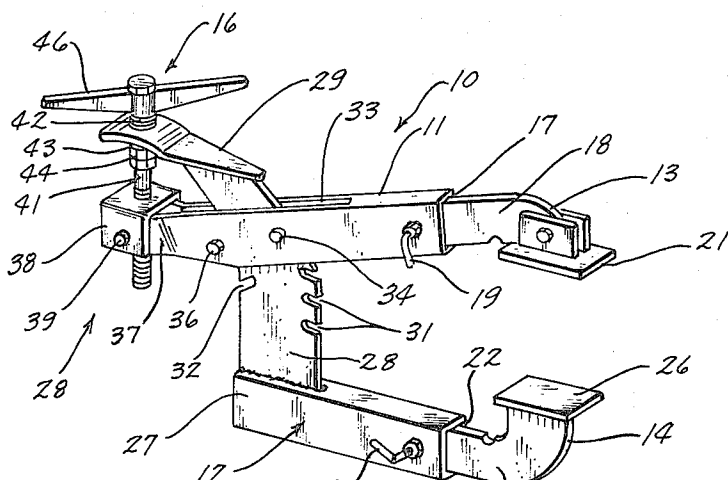


Fig. 1

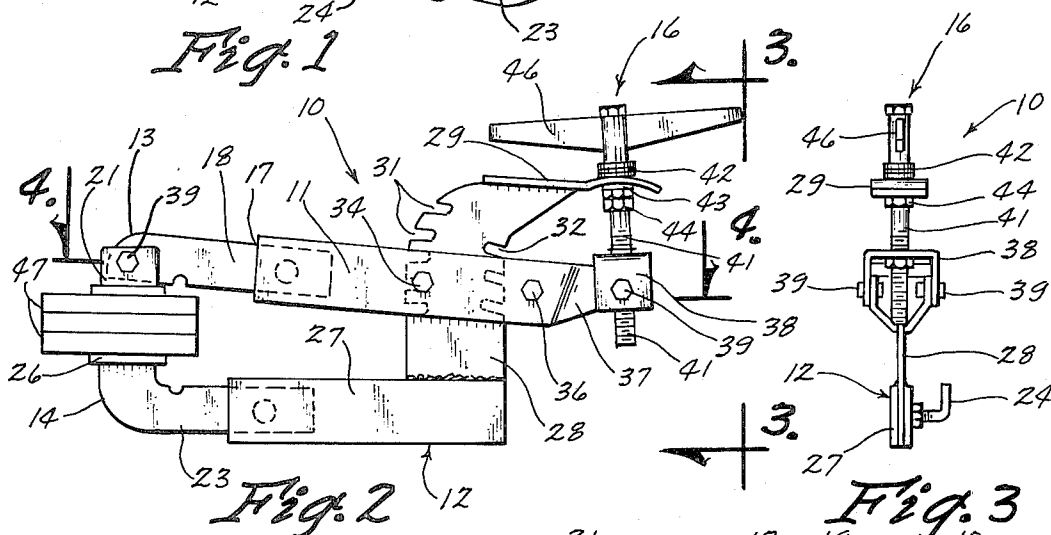


Fig. 2

Fig. 3

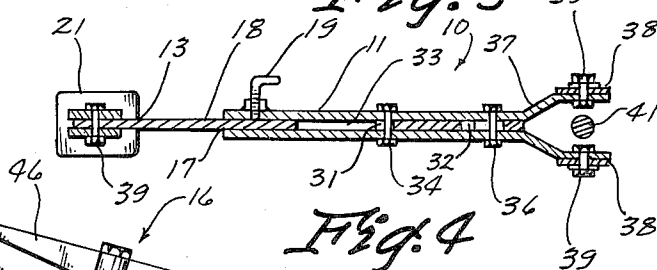


Fig. 4

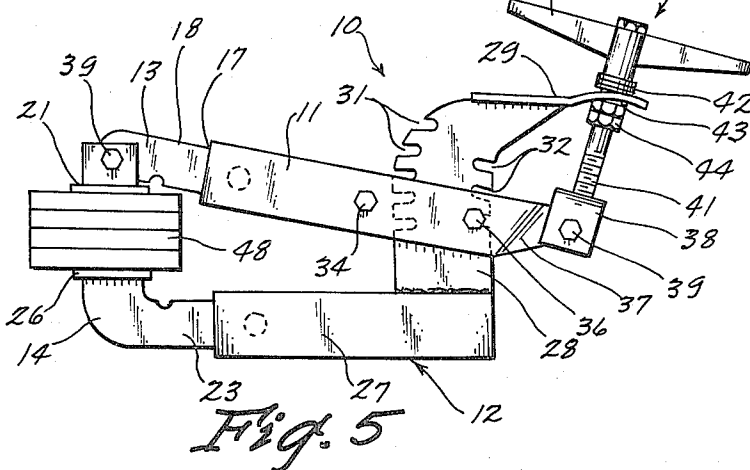


Fig. 5

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CLAMP

BACKGROUND OF THE INVENTION

The present invention relates generally to clamps and more particularly to clamps which have an adjustable leverage factor.

Clamps are one of the earliest tools known to mankind. This may be one reason why there are so many different kinds of clamps in commercial and private use today. While the purpose of a clamp is to hold an object or to hold one object against another, as the particular application of the clamp changes, so has the particular construction of the clamp to be used. The result has been that if a person uses clamps for many different purposes, he has usually been required to obtain a separate clamp for each particular use. This problem is the reason for the multitude of various types and sizes of clamps available today on the commercial market. What was heretofore missing, though it was clearly needed, is a clamping structure which is versatile enough to be used in many different applications where previously many different special clamps were needed.

SUMMARY OF THE INVENTION

A versatile clamping apparatus having two clamp arms which are pivotally attached intermediate the ends thereof, and adaptable to vary the pivotal point and the length of the clamp arms to thereby control the leverage factor and the speed of application of forces by the clamp. A unique jack screw connection aids in permitting this movement of the pivotal point.

An object of the present invention is to provide a versatile clamp which is adaptable to many different uses and applications.

Another object of the invention is to provide a clamping apparatus in which the pivotal point can be changed.

A further object of the invention is to provide a clamping apparatus in which the length of the lever arms may be changed.

A further object of the invention is to provide a clamp which may have a slow action and a high leverage factor, a fast action and a slow leverage factor or a reasonable range of speeds and leverage factors inbetween.

Other objects, advantages, and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the clamping apparatus of the instant invention;

FIG. 2 is a side elevational view of the present invention with a forward pivotal point being used;

FIG. 3 is a back end view of the clamp taken along line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view of the clamp taken along line 4—4 of FIG. 2; and

FIG. 5 is a side elevational view similar to FIG. 2 but showing the clamp using a rear pivotal point.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference numerals designate identical or corresponding parts

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throughout the several views, FIG. 1 shows the clamping device 10 of the instant invention. A first elongated arm member 11 is pivotally attached to a second arm member 12. Object engaging ends 13 and 14 on the forward end of the clamp are controlled by a jack screw device 16 on the rear end thereof.

The first elongated arm member 11 has an opening 17 in the front end thereof in which slidably disposed a bar 18 on the object engaging end 13. The bar 18 can be adjusted to the desired length and tightened by a set screw device 19. Pivotally mounted to the object engaging end 13 of the bar 18 is an object engaging member 21. Similarly, the second arm member 12 has an opening 22 in one end thereof in which is slidably received a bar 23. This bar 23 is likewise adjustable and may be fastened at its desired length by set screw device 24. The object engaging end 14 of bar 23 has a 90° turn thereon, with an object engaging surface 26 on the remote end thereof. This object engaging surface 26 is designed to cooperate with object engaging member 21 on the first elongated arm member 11.

The second arm member 12 is generally comprised of bar portion 23 with the object engaging end 14 thereon, a generally horizontal longitudinally extending arm portion 27, second generally upstanding arm portion 28 and a third generally horizontal arm portion 29. Front slots 31 are formed in the front edge of second generally upstanding arm portion 28 and rear slots 32 are formed in the back edge of generally upstanding arm portion 28.

The second generally upstanding arm portion 28 of second arm member 12 is received through an opening 33 in first elongated arm member 11. A front pivotal rod 34 is disposed on the front side of the second generally upstanding arm portion 28 and a rear pivotal rod 36 is disposed through the opening 33 and on the back edge of second generally upstanding arm portion 28. It can be seen from FIGS. 2 and 5, in particular, that the front pivotal rod 34 can be received in any of the front slots 31, or the back pivotal rod 36 may be received in any of the rear slots 32 in the second generally upstanding arm portion 28.

On the opposite end of first elongated member 11 from the object engaging end 13 is a control end 37 having a pivotal bracket 38 thereon. This bracket 38 is pivoted by bolts 39, and has a threaded central opening on the top side thereof. The third generally horizontal arm portion 29 of second arm member 12 has an arcuate portion thereon with a hole centrally disposed therein. Extending through the hole is a control rod 41 which is threadedly received in the opening in bracket 38 of the first elongated arm member 11. The hole in the third generally horizontal arm portion 29 is substantially larger than the size of the control rod 41 received therein. Additionally sleeves 42 and 43, along with nuts 44 hold the controlled rod 41 in a fixed position longitudinally of the third generally horizontal arm portion 29, but such that it may rotate and rock slightly within the hole in the third generally horizontal arm portion 29. A handle 46 is attached to the upper end of control rod 41 for controlling the movement of the control rod 41.

In operation it can be seen, for example in FIG. 2, that the front pivotal rod 34 can be placed in the proper front slot 31 according to the thickness of the object or objects to be clamped or the speed or leverage action desired. Additionally, the bars 18 and 23 may be ad-

justed to the desired lengths whereby they are directly above and below each other respectively. It can be seen that the object engaging member 21 will be parallel with the object engaging surface 26 because of the pivoted construction of the object engaging member 21. It will also be understood by those skilled in the art that if the object or objects to be clamped are not parallel, then the pivot on object engaging member 21 will allow this member 21 to conform to whatever angle is needed. Once the object or objects 47 are placed on the object engaging surface 26, the jack screw device 16 is then screwed together until the object engaging member 21 firmly presses against the object and against the object engaging surface 26. At that point the clamping is complete and the clamp will hold until the jack screw device 16 is reversed to release the objects 47.

Referring now to FIG. 5 it can be seen that the rear pivotal rod 36 is received in one of the rear slots 32, which are slightly upwardly extending. The objects 48 are placed on the object engaging surface 26 and the jack screw device is then screwed together so as to clamp the object engaging member 21 as explained above with respect to the forward pivotal position. It can be seen in FIG. 5 that the control rod 41 is misaligned with the hole in the third generally horizontal arm portion 29 so that the jack screw forces can most efficiently be used. Also aiding in the efficiency of forces is the arcuate portion of the third generally horizontal arm portion 29 which allows more of the surface of sleeve 42 to contact the third generally horizontal arm portion 29 and therefore distribute the forces applied thereto. It can also be seen in FIGS. 2 and 5 that the bracket 38 prevents any torque forces from being applied to the control rod 41 which would be caused if this pivotal connection was not provided, and which would interfere with the proper threadedly engaging relationship between the control rod 41 and the bracket 38.

It can therefore be seen that the above stated objects have been accomplished in providing an extremely versatile clamp which is adaptable to a multitude of uses and thereby replaces the need to use many different specialized clamps.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. A clamp comprising:

a first elongated arm member having an object engaging end and a control end;

a second arm member having an object engaging end and a control end;

means for pivotally connecting said first and second arms intermediate the ends thereof; and

means for varying the distance between the pivotal connection and the object engaging ends of said first and second arm members, said distance varying means comprising two spaced pivotal rods on said first arm member and at least one opening in said second arm member for receiving each of said pivotal rods, and wherein a plurality of slot shaped openings are disposed on opposite edges of said second arm member, the slot shaped opening on one edge being adapted to pivotally receive one of

said pivotal rods and the slot shaped openings on the other edge of said second arm member being adapted to pivotally receive the other of said pivotal rods.

2. A clamp comprising:

a first elongated arm member having an object engaging end and a control end;

a second arm member having an object engaging end and a control end, said second arm member comprising a first generally horizontal longitudinally extending arm portion, a second generally upstanding arm portion connected at one end thereto at a point remote from the object engaging end of the second arm member, said second generally upstanding arm portion having a front and a back edge, and a third generally horizontal arm portion connected to the other end of the second arm portion and extending in a direction away from the object engaging end of the second arm member;

at least one slot being disposed in the front edge of said second generally upstanding portion of said second arm member and at least one slot being disposed in the back edge of said second generally upstanding portion of said second arm member;

a first pivotal rod connected to said first arm member being disposed on one side of said second generally upstanding portion of said second arm member and adapted to be received in the slot in the front edge of said second generally upstanding portion;

a second pivotal rod spaced from said first pivotal rod being connected to said first arm member and disposed on another side of said second generally upstanding portion of said second arm member and adapted to be received in the slot in the back edge of said second generally upstanding portion; and means for varying the distance between the pivotal connection and the object engaging ends of said first and second arm members.

3. The clamp of claim 2 having means for controlling the relative movement of the control ends of said first and second arm members, and thereby controlling the object engaging ends of said first and second arm members.

4. The clamp of claim 3 wherein the control means comprises a jack screw device including a hole in the control end of the second arm member, a control rod pivotally mounted within the hole, a bracket pivotally attached to the control end the first arm member, said control rod threadedly engaging said bracket, and means for facilitating rotation of the control rod to thereby move the control ends of the first and second arm members with respect to each other.

5. The clamp of claim 2 wherein a plurality of slots are disposed on the front and back edges of said second generally upstanding portion of said second arm member.

6. The clamp of claim 4 wherein said hole is substantially larger than said control rod to permit substantial misalignment of the rod with respect to the hole.

7. The clamp of claim 6 wherein the portion of said third generally horizontal arm portion having the hole therein is of an arcuate configuration to thereby facilitate easier misalignment of the control rod with respect to the hole.

8. The clamp of claim 7 wherein the first elongated arm member has means for adjusting the length thereof on the object engaging end; and

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means for adjusting the length of the second arm member on the object engaging end thereof.

9. The clamp of claim 8 said first elongated arm member has an object engaging member pivotally attached to the object engaging end thereof; and said second arm member has an object engaging sur-

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face on the object engaging end thereof which lies in a generally horizontal plane parallel to the general longitudinal axis of the generally horizontal arm portion of the second arm member.

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