

UNITED STATES PATENT OFFICE

2,610,661

C-CLAMP WITH RIGHT-ANGULARLY
RELATED CLAMPING SCREWS

James Earl Romine, Mishawaka, Ind.

Application February 6, 1947, Serial No. 726,926

2 Claims. (Cl. 144—304)

1

This invention relates to improvements in C-clamps.

The primary object of the invention is to provide a C-clamp which is adapted for use to clamp pieces of different shapes and to clamp together work-pieces which are so shaped and constructed that conventional C-clamps cannot be used thereon.

A further object is to provide a clamp with adjustably positionable means for gripping opposite accessible surfaces of a work-piece adjacent to another and angularly disposed surface thereof to which another object is to be clamped, said clamp including means for pressing and holding said object against said last named surface.

A further object is to provide a clamp with an adjustable extension mounting an adjustable presser element for engaging a portion of a work-piece which is spaced from the portion of the work-piece which is gripped by the clamp.

A further object is to provide a clamp having two work-engaging elements, one of which is pivotally mounted and has two operative positions, wherein said pivoted element has two angularly disposed work-engaging surfaces each selectively disposed in clamping position.

A further object is to provide a device of this character with a pivoted work-engaging head having a flat work-engaging face, and a second work-engaging face forming a V-socket whose median plane is parallel to said first face, wherein the pivot axis of said head is positioned substantially centrally relative to both of said faces.

A further object is to provide a clamp with a work-engaging head pivotally mounted upon a support, said head having a slot receiving said support and spanned by a pivot pin, said support having a pin-receiving aperture of larger diameter than said pin and adapted for end engagement with a wall of said slot while said pin is freely positioned in said aperture.

Other objects will be apparent from the following specification.

In the drawing:

Fig. 1 is a view illustrating one embodiment of the clamp in side elevation.

Fig. 2 is a fragmentary side view of a modified embodiment of the clamp.

Fig. 3 is a detail sectional view of one of the work-engaging heads of the clamp.

Fig. 4 is a view similar to Fig. 3, illustrating the head in a different position.

Fig. 5 is a face view of an arm used in the clamp of the construction shown in Fig. 2.

Fig. 6 is a perspective view illustrating the

2

manner in which the clamp shown in Fig. 2 is used.

Referring to the drawing which illustrates the preferred embodiment of the invention, the numeral 10 designates the frame of the clamp. This frame is formed of metal and is preferably of substantially C-shape as shown. The inner and outer margins of the clamp are preferably provided with reinforcing flanges 11, and the ends of the clamps terminate in enlarged cylindrical coaxial portions 12. The central portion of the frame is preferably provided with an integral enlargement 13 whose outer end projects beyond the outline of the frame to provide a flat abutment surface 14 for purposes to be hereinafter set forth.

The ends 12 of the frame are provided with axially aligned screw-threaded bores. In one of these bores is threaded a screw 15 having a work-engaging head 16 at its inner end and an enlarged head 17 at its outer end. The head 17 is transversely apertured to receive pin 18 constituting a lever facilitating the rotation of the screw 15 for the purpose of tightening the clamp. A screw 19 is threaded in the opposite head. The screw 19 has a flattened shank portion 20 adjacent one end thereof which terminates in an enlarged head 21 which is provided with a central aperture 22.

A work-engaging head 23 is mounted on the inner end of the screw 19. This head comprises a solid metal body provided with a slot 24 centrally thereof and adapted to fit snugly but shiftably around the shank 20 and head 21 of the screw 19. A pin 25 of a diameter smaller than the diameter of the bore 22 spans the slot 24 and extends through the bore 22. The slot 24 is preferably of V-shape whereby the head 23 is permitted to rotate through an angle of slightly more than 90 degrees, that is, between the positions illustrated in Figs. 3 and 4. The diameter of the head 21 of the screw is so correlated with the position of the pin 25 and the size of the slot 24 that the head may bear against the wall of the slot perpendicular thereto, as illustrated in Figs. 3 and 4, without binding the pin 25 or applying clamping pressure thereto.

The screw 19 is provided with a curved shoulder 26 at the junction of the neck 20 therewith, and this shoulder forms a stop engageable by the curved surface 27 of the head 23 to limit rotation of the head relative to the screw in one direction. The head is provided with one flat or planar work-engaging surface 28 and with a V-shaped or slotted work-engaging surface 29 whose median plane is parallel to the face 28.

3

The head is so shaped that the pin 25 is located within the median plane of the V-shaped face 29 and substantially centrally with respect to the flat face 28.

By this construction it is possible for the C-clamp to be used in the conventional manner to grip a work-piece 30, as illustrated in Fig. 1, when the work-piece is positioned between the heads 16 and 23 with the face 28 of the head 23 positioned for engagement with the work-piece. Alternatively, the work-piece may be used to grip a member having a curved surface, as illustrated diagrammatically at 31 in Fig. 4, by positioning the V-shaped face 29 for engagement with that surface 31. Therefore, it will be apparent that the clamp permits the gripping of objects of different shapes and types which previous constructions of C-clamps having conventional heads of the type shown generally at 16 in Fig. 1 cannot effectively grip in a stable and reliable manner.

The enlargement 13 of the frame is provided with a central screw-threaded bore whose axis is preferably perpendicular to the axes of the screws 15 and 19 and which lies in substantially the same plane as the axes of said screws. A screw 32 is threaded in said bore, said screw preferably being provided with an enlarged knurled head 33 or other means by which screw 32 may be tightened. The screw 32 provides means to apply pressure to a work-piece in a direction perpendicular to the direction in which pressure is applied thereto by the screws 15 and 19. Such a construction has a number of advantages and uses, one of which is illustrated in Fig. 1 and entails the application by the screw 32 of pressure upon a member 34 bearing against an edge of a work-piece 30. There are many instances where it is desired to press against an edge of a work-piece, such as the member 30, which is of large size, for example, a table top or the like, a member such as the member 34. This has not been possible by the use of conventional C-clamps heretofore, and special clamping frames have been required for such surfaces, such clamping frames being in the nature of special clamping jigs designed for the work. By the instant construction, however, it will be apparent that the same function can be achieved inasmuch as the screws 15 and 19 may clamp against opposite faces of the work-piece 30 adjacent the edge against which the work-piece 34 is to be pressed to effect a firm anchorage for the clamp, whereupon the screw 32 may be tightened to apply pressure to the member 34. It is essential for this purpose, however, that both of the work-engaging heads 16 and 23 be mounted adjustably upon the frame in order that the work-piece 30 may be positioned properly for application of pressure by the screw 32 at the selected position. Thus the provision of the two screws 15 and 19 enables the clamp to meet any of a large variety of conditions and avoids the necessity of special clamps for special conditions. In other words, the idea of applying pressure at three points would be impractical where one of those points constituted a fixed abutment or anvil as has been customary in previous clamps, since if the narrow work-piece would be engaged by such a three-point clamp, the position of the screw 32 might be such that, when the narrow work-piece was clamped, the screw 32 would extend clear of that narrow work-piece and hence not be usable. No such condition can exist in the instant construction inasmuch as the screws 15 and 19 can be

4

so adjusted that the work-piece 30 will be held in any selected position to permit the application of pressure thereto by the screw 32 at the exact point desired.

The modified form of the clamp, which is illustrated in Fig. 2, entails the use of a rigid arm 40 in conjunction with a clamp of the type illustrated in Fig. 1. The arm 40 is preferably provided with an elongated longitudinal slot 41 at one end thereof which is adapted to fit freely around the screw 32. A nut 42 is threaded onto screw 32 and may be used to clamp the arm 40 flat against the abutment surface 14 of the clamp frame to hold the arm in any selected adjustment relative to the clamp frame. The adjustment made possible by this construction is both rotative and longitudinal. If desired a lock washer 43 may be interposed between the nut 42 and the arm to facilitate the clamping action. The free or outer end of the arm 40 has a screw-threaded aperture 44 therethrough in which is mounted a screw 45 having a work-engaging head 46 at one end and an enlarged knurled head or other operating member 47 at its opposite end.

The clamp construction shown in Fig. 2 is intended primarily for uses of the type illustrated in Fig. 6 where clamping pressure is to be applied in a direction perpendicular to and at a position spaced laterally from the point on the work-piece at which the clamp itself is anchored. Thus in Fig. 6, it is desired to clamp the member 50 to the face of the member 51 which is of such width or dimension that a conventional C-clamp cannot span the same, and which is provided with ends, such as the tapered reinforcing flange 52, which prevent the clamp from being used in the manner illustrated in Fig. 1. The work-piece in this instance is illustrated as being provided with a part 53 having abutment surfaces so spaced and parallel that a C-clamp can be anchored thereto. In such an instance the frame 10 of the C-clamp is positioned for clamping engagement of the work-engaging heads 16 and 23 of the screws 15 and 19 at opposite surfaces thereof, and the arm 40 is so adjusted rotatively and longitudinally that the screw 45 is positioned in desired manner for engagement with the selected pressure point of the member 50. The arm 40 is locked in this position by tightening the nut 42 and the screw 45 is then advanced to apply pressure against the member 50 for the purpose of holding it in face engagement with the member 51. While it will be apparent that the amount of pressure which can be applied to the member 50 is somewhat limited because of the offset relation of the pressure point of the screw 45 with respect to the pressure points of the aligned screws 15 and 19 of the clamp, it, nevertheless, is possible by this construction to apply an amount of pressure adequate for many purposes, for instance, adequate to assure proper engagement of parts which are to be glued together.

It will be apparent, therefore, from the foregoing that the instant clamp provides means by which a wide variety of work-pieces of different shapes and constructions may be engaged and gripped. Hence it will be observed that it is possible to use the clamp to fit around or behind a marginal flange upon an object to be clamped, which arrangement is made possible by the fact that both the screws 15 and 19 are adjustable upon the frame so that both of the heads 16 and 23 can be positioned inwardly behind a flange on the edge of a work-piece 30. In this instance, of

5

course, the screw 32 will be moved or retracted unless it is desired to apply a work-piece 34 to the work-piece 30 in the manner illustrated in Fig. 1.

Another advantage of the device is that the pivotal mounting of the head 23 accommodates the gripping of objects at opposed faces which taper one relative to the other. In actual practice it has been found that a firm grip may be obtained upon a member whose opposite faces are inclined relative to each other by as much as 15 degrees. Hence the clamp has a wide field of use and can be used for many purposes for which it has heretofore been necessary to build special clamping equipment. It will also be apparent that the clamp may be used upon work-pieces of a wide variety of uses, thus further increasing its usefulness.

I claim:

1. A clamp comprising a rigid C-shaped frame, work-engaging members carried by the end portions of said frame and adapted to grip a work-piece therebetween, a screw-threaded member extending through an intermediate portion of said frame whose axis extends perpendicular to and in substantially the same plane as said work-engaging members, said screw-threaded member having a work engaging end within said C-shaped frame, a rigid arm having a longitudinal slot at one end thereof fitting around said screw-threaded member, a member threaded on said screw-threaded member for clamping said arm to said frame in selected rotative and longitudinal adjustment, and a pressure applying member threaded in the free end of said arm and substantially parallel to said screw-threaded member, said last named member having a work engaging end adapted to engage a work piece gripped by said work engaging members.

2. A clamp comprising a rigid C-shaped body, work-engaging members carried by the end portions of said frame and adapted to grip a work-

6

piece therebetween, said frame having an abutment face at an intermediate portion thereof lying in a plane perpendicular to the plane of said body and parallel to said work-engaging members, an intermediate member extending through and projecting from said frame perpendicularly to the work-engaging members and centrally of said surface said intermediate member having a work engaging end within said C-shaped frame, a rigid elongated arm having a longitudinal slot at one end fitting around said projecting member, means for securing said arm in face engagement with said abutment at a selected rotative and longitudinally adjusted portion, and a pressure applying member adjustably mounted at the outer end of said arm and substantially parallel to said intermediate member, said last named member having a work engaging end adapted to engage a work piece gripped by said work engaging members.

JAMES EARL ROMINE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
242,959	Naglee	June 14, 1881
378,585	Gibson	Feb. 28, 1888
1,160,103	Burkhart	Nov. 9, 1915
1,345,177	Heckathorn	June 29, 1920
1,403,580	Vinema	Jan. 17, 1922
1,490,063	Tower	Apr. 8, 1924
2,366,350	Ostling	Jan. 2, 1945
2,450,994	Schaefer	Oct. 12, 1948

FOREIGN PATENTS

Number	Country	Date
6,700	Great Britain	May 18, 1886
136,209	Germany	Nov. 17, 1902