July 31, 1945. N. M. MARSILIUS 2,380,661

CLAMPING FIXTURE

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FIG. 1.

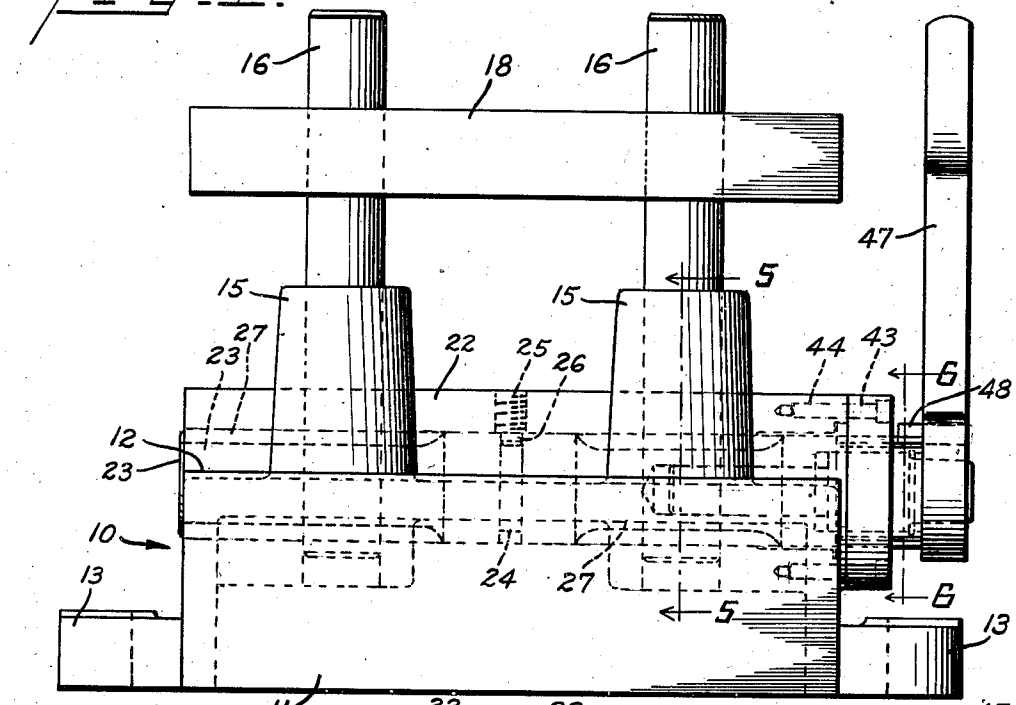


FIG. 2.

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Fig. 3.

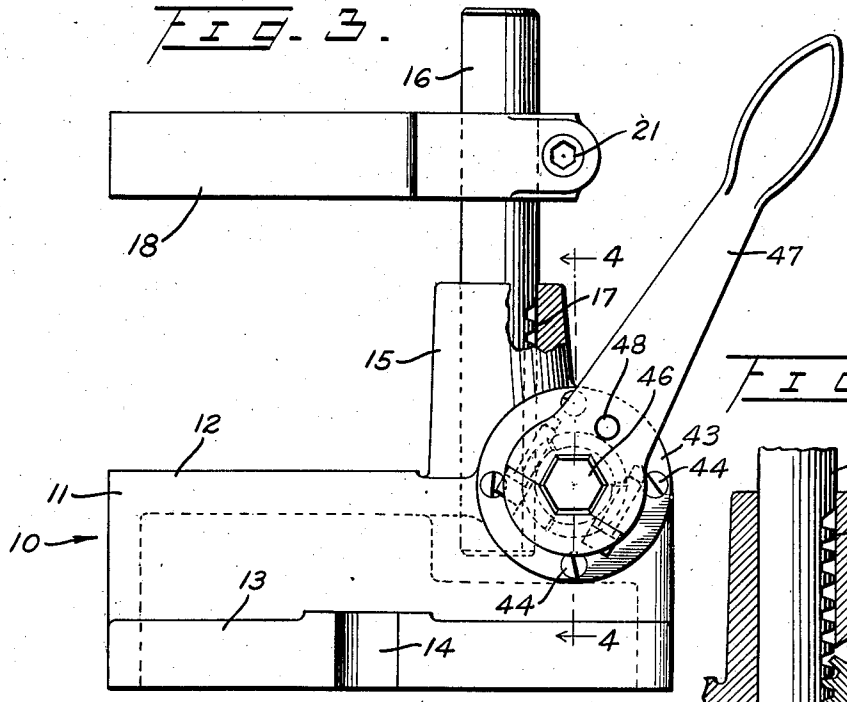


Fig. 5.

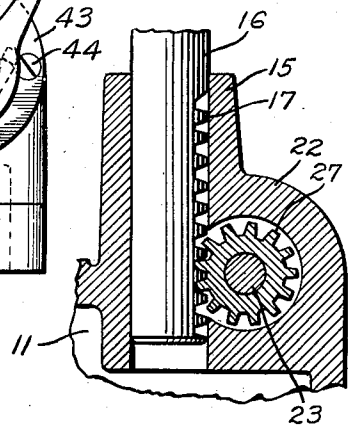


Fig. 4.

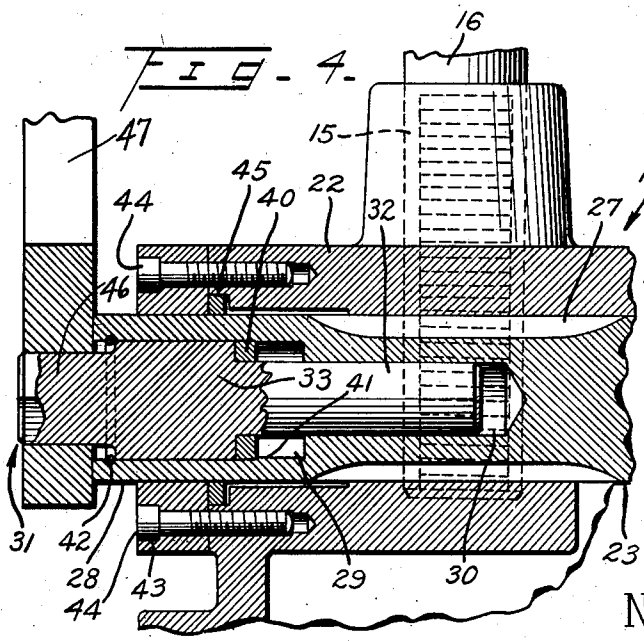
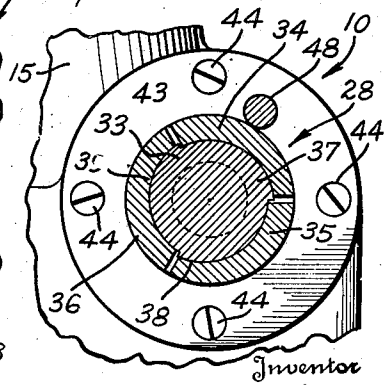


Fig. 6.



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2,380,661

CLAMPING FIXTURE

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Application September 27, 1943, Serial No. 503,957

5 Claims. (Cl. 192—8)

This invention relates to new and useful improvements in clamping fixtures and has particular relation to a quick acting clamp of more or less general application.

The invention provides a clamp of the type indicated and which is of simple construction, easy to operate and which has a long useful life and which may be applied and used in a variety of ways.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevational view of a clamping fixture made in accordance with the invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is an end elevational view, with a small part broken away, the view being taken as looking from the right in Fig. 1;

Fig. 4 is an enlarged sectional view taken as along the plane of the line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken as along the plane of the line 5—5 of Fig. 1; and

Fig. 6 is an enlarged sectional view taken as along the plane of the line 6—6 of Fig. 1.

Referring in detail to the drawings the clamping fixture as here shown comprises a base generally designated 10 including a hollow body portion 11 having a surface 12 adapted to have work disposed thereon. Extending from the sides of body 11 are base flanges 13 provided with notches 14 for the reception of bolts or other means (not shown) used to secure the base 10 to a machine bed or other support.

A pair of tubular portions 15 provide entrances to the interior of the hollow body 11 and receive and comprise guides for a pair of spaced posts 16, each of the latter on its lower or inner rear portion being provided with rack teeth 17. (See Figs. 4 and 5.) Posts 16 are adapted for movements in the direction of their length and mounted by said posts for movement therewith toward and from the base 10 is a clamping means or block 18.

While the block 18 may be rigidly secured to the posts 16 in a number of different ways it is shown as provided with a pair of openings 19 and as split through to its rear edge from each of said openings as at 20. (See Fig. 2.) Openings 19 receive the posts 16 so that the block 18 may be disposed at the desired point along the lengths of the posts and a pair of clamp screws 21 entering the block from each of its ends are adapted to draw the sides of the splits 20 toward one another and effectively clamp the block to the posts. Block 18 is arranged to extend over the surface 12 of the base.

The upper rear portion of the base 10 is raised somewhat providing a housing 22 for a bar 23 shown as extending entirely through the base. Intermediate its ends bar 23 may be circumferentially grooved as at 24 and a screw 25 or the like carried by the housing may have a portion 26 entering such groove and thereby securing the bar against substantial longitudinal movement while permitting of free turning movement thereof.

The inner portion of the housing 22 communicates with the lower rear portion of the tubular guides 15 as shown best in Fig. 5. At a pair of spaced points the bar 23 is provided with gear teeth 27 and such teeth entering the said lower rear portions of guides 15 mesh with the rack teeth 17 on the vertical posts 16. With this construction it will be understood that on turning movement of the bar 23 in one direction the posts 16 will be drawn into the guides 15 and on turning movement of the bar in the opposite direction the posts will be raised. Clearly as the posts are moved inwardly and outwardly of the guides the clamp block 18 is movd toward and from the work supporting surface 12 of the base 10.

At its end 28 the bar 23 is hollow through said end being provided with a larger diameter recess 29 and a smaller diameter recess 30. A pin 31 enters such end of the bar and includes a pilot portion 32 disposed in the recess 30 and a larger diameter portion 33 disposed in recess 29. Portion 28 is split inwardly from its free end whereby it comprises three resilient fingers 34, 35 and 36 (see Fig. 6) although it is to be understood that the precise number of fingers is not controlling. These fingers taper in thickness from edge to edge and the pin portion 33 within these fingers is of ratchet-like construction being provided with three cam-like portions or surfaces 37, 38 and 39.

A washer 40 is located on the pin portion 32 and against the shoulder at the inner end of the pin portion 33 and this washer inwardly abuts a shoulder 41 in the recess 29. Pin 31 is secured in the hollow end portion 28 of the bar 23 by a split spring ring 42 partly entering a groove in the inner surfaces of the fingers 34, 35 and 36

and abutting a shoulder on the pin as shown in Fig. 4. Screws 44 secure a solid locking ring 43 against one end of the housing 22 receiving the bar 23 and such ring is about a portion of the split end 28 of the bar. A gasket 45 may be about the bar portion and inwardly of the ring 43.

Pin 31 projects beyond the free end of the split bar portion 28 and this projecting end 46 of the pin is made angular being shown as hexagonal. A handle 47 having a socket shaped for the reception of pin end 46 receives and is mounted on such end for manual operation to turn the pin 31 and bar 23 and thus impart vertical movement to the posts 16 and clamp block 18. A locking pin 48 projects from the inner side of the handle 47 and is rigid with the latter and bears on the outer surface of the resilient finger 34 although as the description proceeds it will become clear that the said lock pin may bear on any one of the described fingers for the purpose to be set forth.

In the use of the present clamp a piece of work is placed on the surface 12 of the base 10 and then the handle 47 is moved in a counterclockwise direction. This is a manual operation and as the handle is so moved it turns pin 31 and the latter being frictionally engaged with the bar 23 the latter is also turned or given a rotary movement. The mentioned frictional engagement between the pin and bar is the engagement of the ratchet-like portion 33 of the pin with the fingers 34, 35 and 36 of the bar and the engagement of the lock pin 48 with the outer surface of the finger 34. Thus since the bar 23 carries the gears 27 there is a clutch means between the gears and handle and comprising an outer part or the expansible resilient fingers of bar end 28 and an inner part or the portion 33 of the pin 31.

During initial movement of the handle while the pin 31 and bar 23 are turning together the gear teeth 27 of the bar meshing with the rack teeth on the posts 15 the latter are drawn downwardly and move the block 18 downwardly toward the work on the surface 12 of the base. When a series of pieces of the same size are to be successively held by the present clamp the block 18 is so positioned on the posts 15 that the minimum movement of the block will bring the latter against any work supported on surface 12.

When the block 18 engages the work there is a positive resistance to further downward movement of the block and the latter being rigidly secured to the posts 15 there is the same resistance to further movement of the posts and the bar 23 geared to the posts. Now as the handle is forced further in a counterclockwise direction the cam-like portions 37, 38 and 39 of the ratchet-like portion 33 act against the arcuately wedge-shaped resilient fingers 34, 35 and 36 and have a cam-like expanding action on said fingers.

Fingers 35 and 36 are finally expanded into tight engagement with the lock ring 43 so that the bar 23 is held against movement in either counter-clockwise or clockwise direction. At the same time finger 34 has become wedged between the cam surface 37 of pin part 33 and the lock pin 48 which moved slightly along the outer surface of finger 34 while cam-like portion 37 was moving on the inner surface of such finger. When the resilient finger 34 is thus wedged it is secured to the handle and further pressure on the latter tends to further turn the bar 23 to tighten the block 18 against the work. Clearly owing to the arcuate taper or wedge-shape of the finger 34 and the fact that the lock pin 48 is in fixed relation to the surface 37 of portion 33 the movement of the handle independent of the bar 23 is very limited.

Thus almost immediately the work on surface 12 is engaged by block 18 the said block is tightened into engagement with the work and locked in such position. A slight reverse movement of the handle carries the surface 37 and pin 48 from tight clamping or wedged relation with the finger 34 and the surfaces 38 and 39 from their tight engagement with the fingers 35 and 36 permitting the latter to move away from the locking ring 43. The shoulders at the ends of the surfaces 37, 38 and 39 may then be brought into engagement with the side edges of the fingers 34, 35 and 36, respectively, to positively move the bar 23 in a clockwise direction raising the posts 15 and the clamping block 18 to carry the latter from the work.

Having thus set forth the nature of my invention, what I claim is:

1. A quick acting clamp including a pair of parts of which one is disposed within the other, the other of said parts being split to provide it with resilient expansible fingers, a lock ring about said split part, said inner part comprising a body and cam-like teeth within said split part and bearing against the fingers thereof, means for turning said inner part, a bearing means turnable with said inner part and engaging the outer surface of one of said fingers whereby on turning of said inner part in said outer part said engaged finger is held against expanding movement and the inner and outer parts are locked together and the other fingers of the latter are forced against and held by said lock ring.

2. A quick acting clamp comprising inner and outer parts of which the outer part comprises a split tubular portion whereby it includes a series of resilient fingers, said fingers arcuately wedge shaped, said inner part comprising a body having cam-like teeth within the split portion of the outer part and engaging the inner surfaces of the fingers thereof, means having a fixed relation to and movable with said inner part and engaging the outer surface of one of said fingers, fixed means at the outer side of another of said fingers, and means for imparting turning movement to said inner part to grip the first mentioned finger between the inner part and the means having a fixed relation thereto and to expand another of said fingers into tight engagement with the fixed means at the outer side thereof.

3. A quick acting clamp comprising inner and outer parts of which the outer part comprises a split tubular portion whereby it includes a series of resilient fingers, said fingers arcuately wedge shaped, said inner part comprising a body having cam-like teeth within the split portion of the outer part and engaging the inner surfaces of the fingers thereof, means having a fixed relation to and movable with said inner part and engaging the outer surface of one of said fingers, fixed means at the outer side of another of said fingers, means for imparting turning movement to said inner part to grip the first mentioned finger between the inner part and the means having a fixed relation thereto and to expand another of said fingers into tight engagement with the fixed means at the outer side thereof, and shoulders on said body and adapted to engage the edges of the respective resilient fingers of said outer part to reverse the movement

thereof on turning of said inner part in the opposite direction.

4. In a clamp fixture, a clutch means including a pair of parts of which one is turnable in the other, the other of said parts being split to provide it with resilient expansible fingers, a lock ring about said split part, said inner part comprising a body and cam-like teeth within said split part and bearing against the fingers thereof, means for turning said inner part, a bearing means turnable with said inner part and engaging the outer surface of one of said fingers whereby on turning of said inner part in said outer part said engaged finger is held against expanding movement and the inner and outer parts are locked together and the other fingers of the latter part are forced against and held by said lock ring.

5. In a quick acting clamp, inner and outer parts, means for positively applying a turning pressure to said inner part, said outer part including resilient fingers, cam surfaces on the inner part and engaging the inner surfaces of said fingers to expand the latter on turning of said inner part in the outer part, fixed means at the outer side of one of said fingers and against which the latter may be expanded, means engaging the outer surface of another of said fingers and having a fixed center relation to and movable with said inner part, and said fingers arcuately wedge-shaped whereby on turning of the inner part in the outer part the last mentioned finger of the latter part is wedged between a cam surface of the inner part and the means having a fixed center relation to the inner part and the other mentioned finger is forced outwardly into tight engagement with the fixed means at the outer side thereof.

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