E. C. LEWIS.

MACHINE TOOL FIXTURE.

APPLICATION FILED DEC. 22, 1919.

1,382,793. Patented June 28, 1921.

2 SHEETS—SHEET 1.

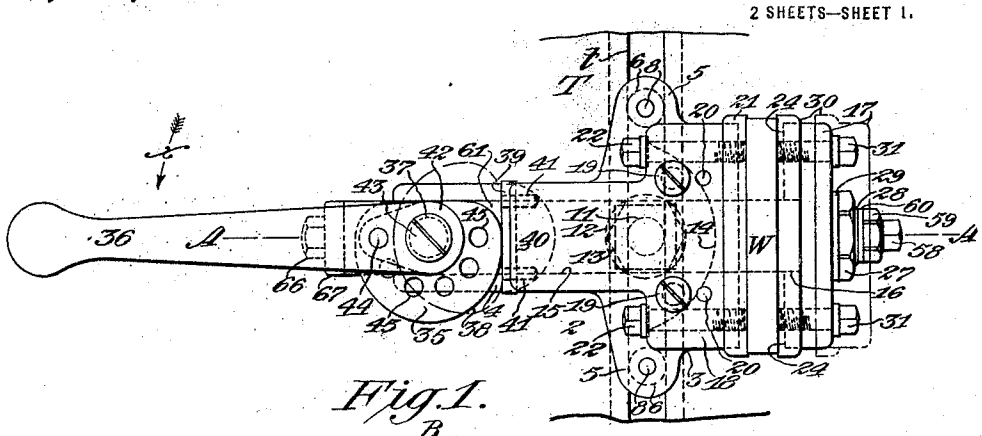


Fig. 1.

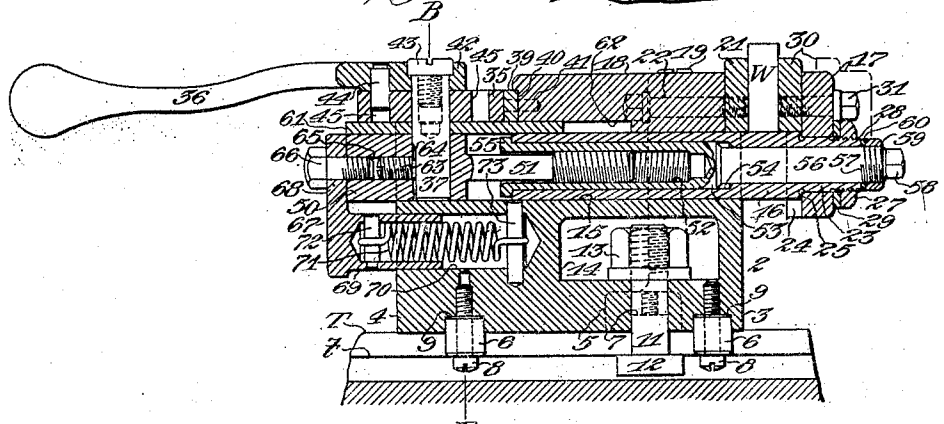


Fig. 2.

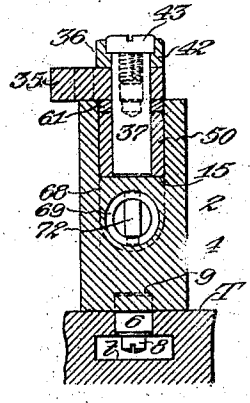


Fig. 3.

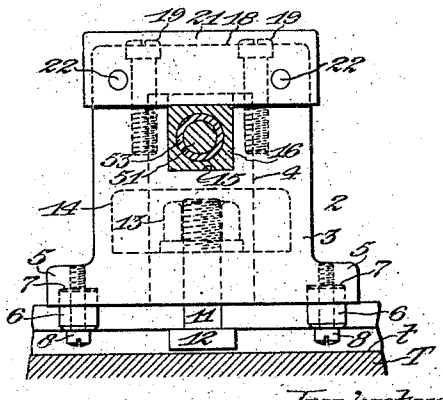


Fig. 4.

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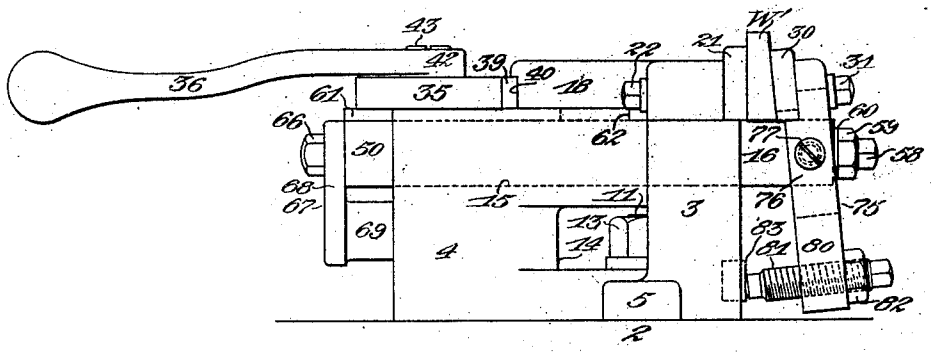



Fig. 5.

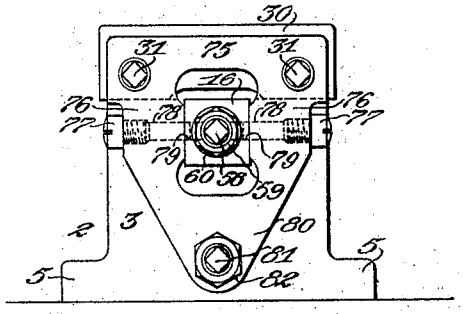



Fig. 6

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# UNITED STATES PATENT OFFICE.

EVERETT C. LEWIS, OF PROVIDENCE, RHODE ISLAND.

## MACHINE-TOOL FIXTURE.

1,382,793. Specification of Letters Patent. **Patented June 28, 1921.**

Application filed December 22, 1919. Serial No. 346,530.

*To all whom it may concern:*

Be it known that I, EVERETT C. LEWIS, a citizen of the United States, residing at Providence, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Machine-Tool Fixtures, of which the following is a specification.

My invention is an improved fixture for holding work to be operated upon in milling machines, grinding machines or other machine-tools.

One object of my improvement is to provide a fixture which will hold the work with greater firmness and rigidity to resist the thrust of the tool acting against it.

Another object of the improvement is to provide for greater facility and convenience in applying the work to the fixture and for a quicker action in clamping the jaws of the fixture against the work.

A further object of the improvement is to render the fixture more easily and quickly adjustable for pieces of work of varying sizes and shapes.

Another object of the improvement is to provide a fixture of more rugged and stanch structure, capable of resisting strain and wear on its operating parts and having greater durability under hard usage.

Still further objects of the improvement will appear from the following specification comprising a detailed description of one embodiment of the invention as illustrated by the accompanying drawings, in which like reference characters designate like parts. In the drawings:

Figure 1 is a plan view of my improved fixture;

Fig. 2, a longitudinal, sectional elevation of the device, taken in a median plane on the line A—A of Fig. 1;

Fig. 3, a detailed view of a portion of the device in cross-section, taken on the line B—B of Fig. 2;

Fig. 4, an elevation of the forward end of the device;

Fig. 5, a side elevation of the device showing a modification in the arrangement of its movable jaw-member which adapts it for holding tapered pieces; and

Fig. 6, an end view of this type of device.

Referring to the drawings, 2 designates the main frame or base of the fixture which is constructed with a relatively broad T-head 3 at its forward end, and a narrower tail-piece 4 extending rearwardly therefrom. Reaching out from the sides of the base 2 at the rear of its head 3 are ears 5, see Figs. 1 and 4, to which are attached tongues 6 for locating the fixture on the table T of the milling-machine or other tool with which it is used. The tongues 6 may consist of cylindrical plugs set into counterbores 7 on the under side of the ears 5 and secured in place by screws 8. The tongues 6 are adapted to enter a T-slot *t* on the top of the table T, see Figs. 1 and 4, to hold the fixture square therewith. The tongues 6 may also be inserted in other counterbores 9 at the forward and rearward ends of the base 2, see Fig. 2, to adapt the fixture to be set parallel with the slot *t* in the table T. At the center of the base 2 is a fastening-bolt 11 having a head 12 at its lower end adapted to underlie the sides of the T-slot *t* in the table T, as shown in Figs. 1 and 2. The bolt 11 carries a nut 13 at its upper end arranged in a cut-out recess 14 in the base 2, so that it may be turned by a wrench to draw the head 12 of the bolt against the overhanging sides of the slot *t* to clamp the fixture down against the table T.

The top of the base 2 is formed with a rectangular slot 15 extending throughout its length, longitudinally of the tail-piece 4. Fitted to slide in the slot 15 is a square bar 16 which serves as a movable support for the outer jaw-carrying member 17 of the fixture. A cap 18, conforming to outline of the base 2, is fitted to its top across the slot 15 to hold the bar 16 in place therein, the cap being secured to the base by screws 19 and dowel-pins 20. Abutting the forward end of the cap 18 is the fixed jaw 21 which is secured thereto by screws 22 reaching through from the rear. The movable jaw support 17, before mentioned, is fitted to a stud 23 projecting from the forward end of the sliding bar 16 and is formed with lugs or ribs 24 abutting the sides of the square end of the bar to prevent it from turning thereon. The jaw-support 17 is held against a shoulder 25 on the bar 16 by means of a nut 27 screwed onto the threaded end 28 of the stud 23 against a washer 29. On the jaw-support 17 is the movable jaw 30 of hardened steel, similar to the fixed jaw 21, and held in place by the screws 31.

The movable jaw 30 is adapted to be drawn toward the fixed jaw 21, to clamp the work W therebetween, by the sliding

movement of the bar 16. The bar 16 is slid rearwardly through the slot 15 of the base 2 under the action of a cam 35 operated from a handled lever 36. The cam 35 is rotatable on a stud 37 with its curved edge 38 bearing against a hardened thrust-plate 39. The plate 39 is set in a slot 40 at the rear of the cap 18, which, as will be noted by reference to Figs. 1 and 2, does not extend clear to the end of the tail-piece 4 of the base 2. The plate 39 is held in place by a suitable means, such as the pins 41, and serves as a wear-resisting element to take the thrust of the cam 35. The handle or lever 36 has a hub 42 rotatably mounted on the stud 37 and held in place by the countersunk head of a screw 43 screwed down into the stud. Riveted through the lever 36 is a pin 44 which projects downwardly to adapt it to enter any one of a series of holes 45 spaced around the cam 35. By removing the screw 43 the lever 36 may be lifted and turned in relation to the cam 35, its pin 44 being then set in any one of the holes 45 to provide for the most convenient position of the handle in accordance with the location of the fixture on the tool.

Referring particularly to Fig. 2, the stud 37 is held in a rectangular slide or block 50 fitted to the slot 15 in the base 2 in which the bar 16 slides. Reaching forward from the slide 50 is a threaded rod or bolt 51 which is screwed into the axial, threaded bore 52 of a stud 53. The stud 53 is fitted to a longitudinal bore 54 in the sliding bar 16 and is provided with a head 55 abutting the rearward end thereof. The forward end 56 of the stud 53 is reduced in diameter and projects through the stud 23 at the front end of the bar 16. Its protruding end is screw-threaded at 57 and terminates in a square nut 58 formed thereon. Screwed onto the threads 57 is a nut 59 acting against the washer 60 which abuts the end of the stud 23 on the bar 16. The nut 59 coöperates with the head 55 on the stud 53 to hold the latter longitudinally of the bar 16, while allowing it to turn therein. By turning the stud 53 through the means of a wrench applied to its squared end 58 the movable jaw 30 may be adjusted in relation to the fixed jaw 21 in the manner and for the purpose as hereinafter more fully explained.

On the top of the block 50 is a cover-plate 61 which is held in place by the cam 35 and slides in the slot 15 in the base 2. It will be observed from Figs. 3 and 5 that the sides of the slot 15 extend above the top of the bar 16 along the tail-piece 4, the cap 18 being cut away at 62 on its under side to provide a space for the plate 61 as shown in Fig. 2. The plate 61 slides in under the cap 18 and covers the slot 15 at the rear of the cap to prevent dirt or chips from working down into the slot.

The stud 37 is held in the block 50 by means of a set-screw 63, see Fig. 2, screwed in from the rear of the block with its end engaging a slot 64 on the side of the stud. The threaded hole 65 for the set-screw 63 also receives the end of a bolt 66 which fastens a guide-member 67 to the rear face of the block. The member 67 consists of a vertical plate 68 provided with a cylindrical sleeve 69 projecting forwardly from its lower end. The sleeve 69 enters a horizontal bore 70 in the base 2 and slides therein under the movement of the block 50; thereby acting as a guide and brace for the block to prevent it from raising up out of the slot 15 in the base. The sleeve 69 also serves as a housing for a coiled spring 71 which acts to draw the block or slide 50 forward in the fixture to force its jaws apart and maintain the cam 35 bearing against its thrust-plate 39. One end of the spring 71 is anchored to a pin 72 extending across the bore of the sleeve 69; while its opposite end is fastened to a cross-pin 73 at the end of the bore 70.

In the modified form of the device illustrated in Figs. 5 and 6 I provide a rockable support 75 for the movable jaw 30 which is pivoted to rock on a horizontal axis on the sliding bar 16. As shown more particularly in Fig. 6, the support 75 is formed with lateral bearings 76 abutting the sides of the bar 16 and pivoted thereto by screws 77. The screws 77 are screwed through the sides of the support 75 and provided with reduced extensions 78 engaging bores 79 in the opposite sides of the bar 16. The support 75 carries the jaw 30 secured at its top by the screws 31, and below its bearings 76 is a triangular extension 80 carrying an adjusting-screw 81 at the bottom with a check-nut 82 on its outer end. The screw 81 is rounded off on its inner end and bears against a hardened block 83 set into the front of the base 2. By releasing the check-nut 82 the screw 81 may be adjusted through its bearing in the support 75 to rock the latter on its pivots 78, whereby to vary the angularity of the working face of the jaw 30 to adapt it to the taper of an angular piece W′ held in the fixture. The construction and arrangement of the parts of my improved device having now been described in detail, its method of operation will next be explained.

My improved fixture is attached to the table T of the milling machine or other machine-tool by setting the tongues 6 in the appropriate counterbores 7 or 9 and engaging them in the T-slot *t* in accordance with the position in which the device is to set. The holding screw 11 at the center of the base 2 is also slid into the slot *t*, with its head 12 underlying the sides thereof, and when its nut 13 is tightened it will clamp the fixture firmly in place on the table T. The device is most generally used where it is required to

machine or finish pieces of uniform dimensions in quantity lots, although it is equally well adapted for individual work, as in tool-making. Where the work is uniform only one adjustment of the jaws of the fixture is necessary and this is accomplished in the following manner: The handle or lever 36 is swung around to turn the cam 35 into the position illustrated by the dash-lines in Fig. 1 with its straight side against the thrust-plate 39. This action allows the spring 71, acting through the guide-member 67, to slide the block 50 forward in the slot 15, and the bolt 51 on the block pushes the slide-bar 16 forward to move the jaw 30 away from the fixed jaw 21. The piece W to be operated upon is next placed in position between the jaws, and the outer jaw 30 adjusted on the stud 23 of the bar 16 to leave a slight space between it and the side of the piece. The jaw 30 is adjusted in relation to the fixed jaw 21 by turning the stud 53 with a wrench applied to its squared end 58, whereby to either shorten or lengthen the telescoping connection 51—56 between the slide 50 and bar 16. Now when the operating handle 36 is turned back in the direction indicated by the arrow *x*, Fig. 1, the rounded face 38 of the cam 35 will be brought against the thrust-plate 39 to cause the slide or block 50 and its connected bar 16 to be withdrawn through the base 2, whereby to draw the movable jaw 30 toward the fixed jaw 21 to clamp the work W therebetween. This action causes the jaws to bind firmly against the sides of the piece W, thus holding it with a firm grip until the handle is thrown back again to release the wedging action of the cam. It will be noted from Fig. 1 that the curved face 38 of the cam 35 is formed eccentric to the axis of the stud 37 on which the cam turns so that a more extended movement of the jaw 30 may be effected by turning the handle 36 beyond the point shown in the drawing. This provides for a considerable range of action of the jaws to accommodate pieces of different thickness, and where a greater movement is required the outer jaw 30 may be further adjusted on the slide-bar 16.

In the modified form of device shown in Figs. 5 and 6 the outer jaw 30 may be adjusted at an inclination to the vertical to accommodate angular-sided pieces and, when necessary, the working face of the jaw 21 may be beveled or inclined to accommodate different shapes in the work.

My improved device provides for a quick action of the jaws both in gripping and releasing the work, and their clamping effect is particularly powerful and secure. It is to be observed that the work W is held against the fixed jaw of the device in such manner that the thrust of the tool on the piece will be taken on the solid base of the fixture, whereby to provide greater rigidity and to prevent chattering or vibration of the tool on the work. It is also to be noted that the operating handle or lever 36 may be adjusted on the cam 35 through an angle of one hundred and eighty degrees so that it may be set in whatever relation is most convenient for the operator in accordance with the different positions in which the fixture is set on the machine.

Particular attention is called to the stanchness of the device as provided by the structure of its base 2 and the arrangement of the operating parts within the base. It will also be noted that this self-contained feature of the mechanism protects the working parts from dirt and chips, while making for improvement in the general appearance and neatness of the device. My improved fixture is lighter and more compact than the usual devices employed for like purposes, yet is particularly stanch and rugged and proof against wear or deterioration under hard usage.

Various modifications might be made in the design and structure of the device without departing from the spirit or scope of the invention; therefore, without limiting myself to the exact embodiment herein shown and described, what I claim and desire to secure by Letters Patent is:

1. In a fixture for machine-tools, the combination with a base, of a fixed jaw on said base, a movable jaw, a support for the movable jaw slidable on the base, automatically-operated means for sliding the support to open the jaws, a cam for sliding the support to close the jaws, and a variable connection between the cam and support for adjusting the operative relation between the movable jaw and fixed jaw.

2. In a fixture for machine-tools, the combination with a base, of a fixed jaw on said base, a movable jaw arranged opposite the fixed jaw, resilient means for sliding the movable jaw away from the fixed jaw, means to slide the movable jaw toward the fixed jaw, a cam for operating said means, and means for adjusting the position of the sliding means to vary the operative relation between the movable jaw and fixed jaw.

3. In a fixture for machine-tools, the combination with a base, of a fixed jaw on said base, a member slidable on the base, a movable jaw carried by said member, means connected to slide the jaw-carrying member, means for manually operating the sliding-means to close the jaws, means for automatically operating the sliding means to open the jaws, and means for adjusting the connection between said sliding-means and the jaw-carrying member to vary the width of the opening between the jaws.

4. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base,

a movable jaw, a slidable support for the movable jaw, a spring for sliding the support to move the movable jaw away from the fixed jaw, a rotatable cam for sliding said support to move the movable jaw toward the fixed jaw, a lever for operating the cam, and means for connecting the lever with the cam in different positions of angular adjustment whereby to provide for the most convenient position of operation of the lever.

5. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a movable jaw, a slidable support for the movable jaw, a rotatable cam for sliding said support, said cam provided with a series of holes arranged circumferentially of its axis, a lever pivoted on the axis of the cam, and a pin carried by the lever and adapted for engagement with the holes in the cam to connect the lever therewith while providing for its adjustment in angular relation thereto.

6. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a support slidable on the base, a movable jaw carried by said support, a slide for sliding the support, manually-operable means for sliding the slide, and means extending through the base to connect the slide with the support, said connecting-means being longitudinally-adjustable to vary the operative relation between the movable jaw and fixed jaw.

7. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a support slidable on the base, a movable jaw carried by said support, a slide for sliding the support, manually-operable means for sliding the slide, a screw-threaded telescopic connection extending through the base between the slide and support, and means for adjusting said connection longitudinally to vary the operative relation between the movable jaw and fixed jaw.

8. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a movable jaw, a slidable support for the movable jaw, a slide for sliding the support, manually-operable means for sliding the slide, a screw-threaded telescopic connection on the slide extending through the base, and adjustable means on the support engaging the threads of the connection to vary the longitudinal relation between the slide and support to regulate the operative relation between the movable jaw and fixed jaw.

9. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a movable jaw, a slidable support for the movable jaw, a slide for sliding the support, manually-operable means for sliding the slide, a screw projecting from the slide, and a rotatable stud held longitudinally of the support and provided with an internally-threaded bore engaging the end of the screw, said stud having means at its end whereby it may be turned to adjust the longitudinal relation between the slide and support to regulate the operative relation of the jaws.

10. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a bar slidable in the base, a movable jaw carried by said bar, a slide for sliding the bar, manually-operable means for sliding the slide, a stud rotatable in the support and projecting therefrom with a nut at its end, and a screw on the slide engaging a threaded bore in the stud.

11. In a machine-tool fixture, the combination with a base, of a fixed jaw on said base, a bar slidable in the base, a movable jaw at the end of the bar, a slide slidable on the base, a cam rotatable on the slide to act against the base, and an adjustable screw-threaded telescopic connection between the slide and bar for varying the operative relation between the jaws.

12. In a machine-tool fixture, the combination with a base, of a bar slidable in a slot in the base, a cap for holding the bar in its slot in the base, a fixed jaw on said cap, a movable jaw on the end of the bar, a slide slidable in the slot in the base, an adjustable telescopic connection between the slide and the bar, and a cam rotatable on the slide to adapt it to act against the cap to slide the bar to open and close the jaws.

13. In a machine-tool fixture, the combination with a base, of a bar slidable in a slot in the base, a cap for holding the bar in the slot, a fixed jaw on the cap, a movable jaw on the bar, a slide slidable in the slot in the base, a longitudinally-adjustable connection between the slide and bar, a cam for sliding the slide to move the bar to draw the movable jaw toward the fixed jaw, and a spring acting on the slide to move the bar to open the jaws.

14. In a machine-tool fixture, the combination with a base, of a rectangular bar slidable in a slot in the base, a fixed jaw on the base, a movable jaw, a support for the movable jaw fitted to the end of the slidable bar, a nut for securing the support on the bar, an elongated stud extending through a bore in the bar and projecting forwardly therefrom with a nut at its end, means for holding the stud longitudinally of the bar while allowing it to turn therein, a slide, a screw on the slide threaded into the stud in the bar, and a cam for sliding the slide to move the bar to open and close the jaws.

15. In a machine-tool fixture, the combination with a base, of a bar slidable in a slot in the base, a cap for holding the bar in the slot, a fixed jaw on the cap, a movable jaw on the bar, a slide slidable in the slot in the

base, a cam for sliding the slide, a longitudinally-adjustable connection between the slide and bar, and a guide projecting downwardly from the slide and slidable in a bore in the base to steady the movement of the slide.

16. In a machine-tool fixture, the combination with a base, of a bar slidable in a slot in the base, a cap for holding the bar in the slot, a fixed jaw on the cap, a movable jaw on the bar, a slide slidable in the slot in the base, a cam for sliding the slide, a longitudinally-adjustable connection between the slide and bar, a guide on the slide having a hollow stud slidable in a bore in the base, and a spring housed in said stud and bore and acting on the guide to slide the slide against the action of the cam.

17. In a machine-tool fixture, the combination with a base, of a fixed jaw on the base, a support slidable on the base, a movable jaw carried by said support, means extending between the movable jaw and the base for adjusting the jaw in angular position on the support, a slide for sliding the support to move the movable jaw toward and away from the fixed jaw, a longitudinally-adjustable connection between the slide and support, and a cam for operating the slide to open and close the jaws.

18. In a machine-tool fixture, the combination with a base, of a fixed jaw on the base, a support slidable on the base, a movable jaw pivotally mounted on the support to adapt it to rock in relation to the fixed jaw, an adjusting-screw carried by the jaw and adapted to engage the base for rocking the jaw on its support, and manually-operable means for sliding the support to move the movable jaw toward and away from the fixed jaw.

In testimony whereof I affix my signature.

EVERETT C. LEWIS.