Aug. 7, 1945. M. L. ALBRECHT ET AL 2,381,480

CLAMP

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FIG. 2

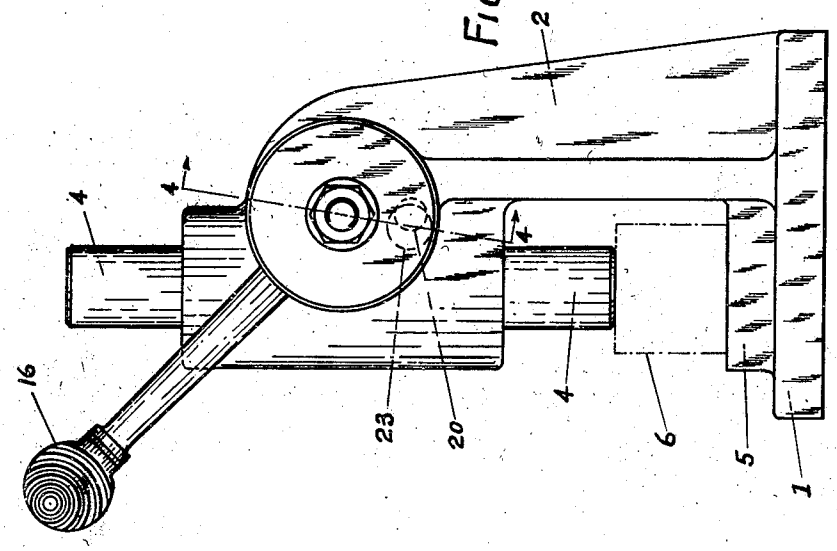
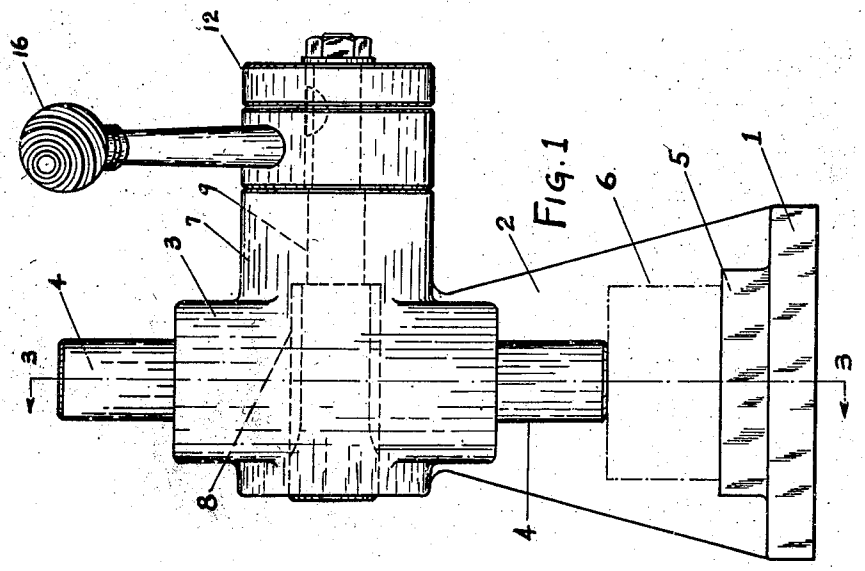


FIG. 1



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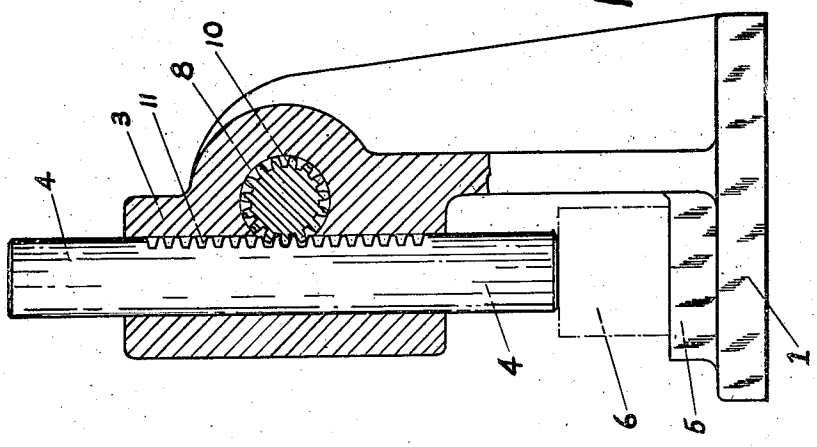
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FIG. 3



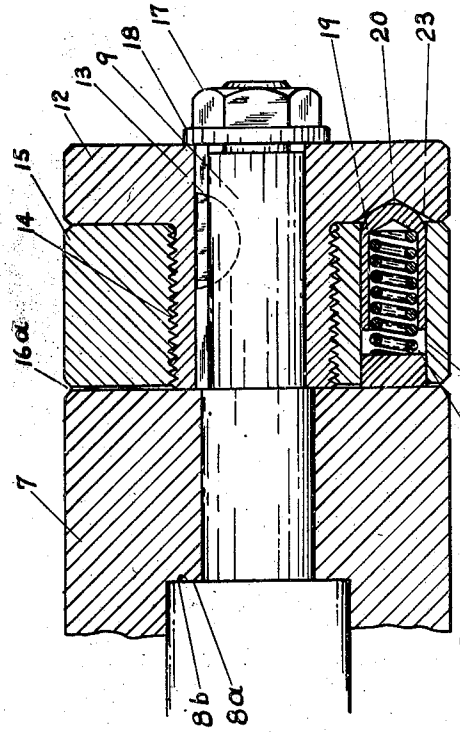


FIG. 4

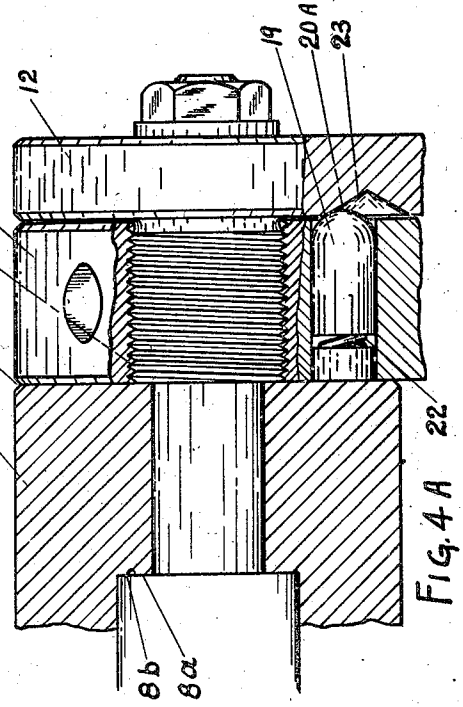


FIG. 4A

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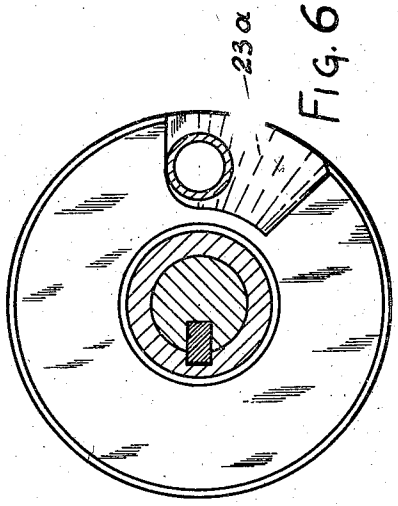


FIG. 6

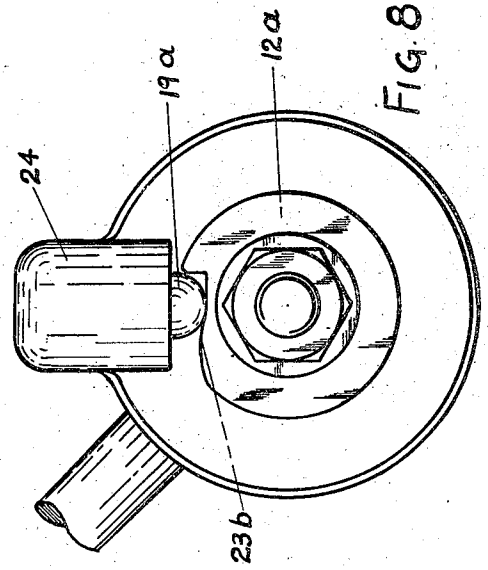


FIG. 8

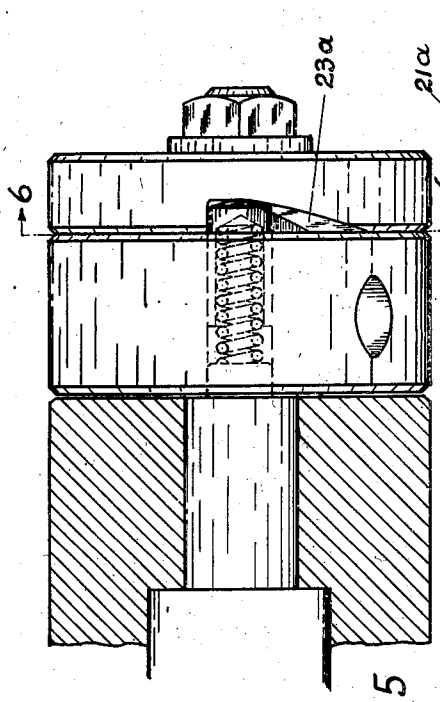


FIG. 5

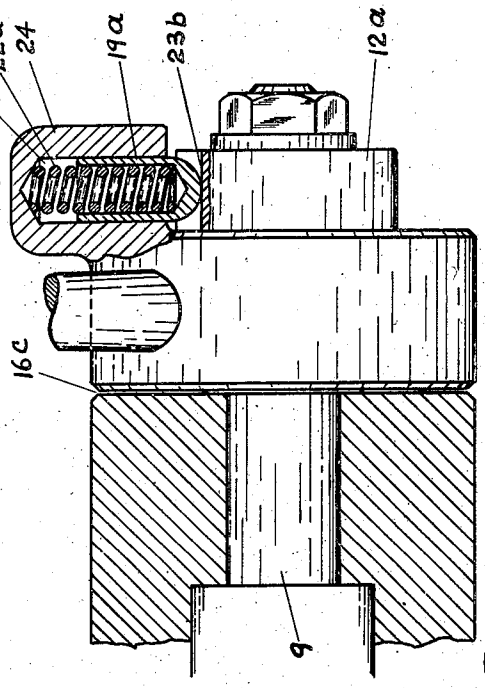


FIG. 7

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Patented Aug. 7, 1945

2,381,480

UNITED STATES PATENT OFFICE

2,381,480

CLAMP

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Application April 15, 1944, Serial No. 531,265

3 Claims. (Cl. 192—8)

Our invention relates to clamps, particularly of the type wherein there is a fixed table or base or jaw on which work or a jig or fixture is placed and in which a movable jaw is moved into clamping position against the work to hold it in position.

So far as we are advised, in connection with previously designed clamps of the type to which our invention relates, there has never been provided a clamp which permits a frictionally clamped work holding condition which is readily releasable by manual actuation of the same handle by which the work is originally clamped. All clamps of this type depend on spring pressure exerted on the clamping members themselves.

It is an object of our invention to provide a clamp having a manually actuable mechanical movement for quickly moving the parts into work clamping position and with frictionally interlocking mechanism which becomes effective when the work is clamped for maintaining the clamped condition of the work, said frictional interlocking mechanism being brought into play by nothing more than a continuation of movement of the parts by which clamping condition is effected. The foregoing objects and other objectives directed towards reducing the cost of manufacture of the clamp and at the same time permitting a very effectual operation, we accomplish by that certain combination and arrangement of parts of which we have shown a preferred embodiment.

In the drawings:

Figure 1 is an end elevation of a preferred assembly.

Figure 2 is a side elevation.

Figure 3 is a vertical section as would appear along the line 3—3 in Figure 1.

Figure 4 is a lateral section as would appear along the line 4—4 of Figure 2.

Figure 4*a* is also a lateral section as would appear along the line 4—4 in Figure 2, excepting that in Figure 4*a* the parts have been advanced to frictional interlocking condition.

Figure 5 is a sectional view of a modified type of frictional interlock.

Figure 6 is a vertical section along the line 6—6 of Figure 5.

Figure 7 is a sectional view showing a still further modification of the frictional interlocking mechanism.

Figure 8 is an end elevation of the parts shown in section in Figure 7.

A housing, preferably cast in one piece, has a base portion 1, an upright extension 2, and an enlarged tubular portion 3 which is bored to receive the movable clamping jaw member 4. On the base there is a table 5 upon which work as indicated at 6 in dotted lines is usually supported.

The clamping operation consists in moving the movable clamping member 4 so that its lower surface engages the upper surface of the work and thus holds it in clamped position.

It will be obvious that whether the table 5 is or is not adjustable in an upward direction forms no part of our invention since our invention is specifically related to the mechanism for actuating the clamping jaw 4.

The housing has a boss 7 counterbored as indicated at 8 to receive a spindle 9 which carries a pinion 10. A shoulder 8*a* on the spindle has a rotating fit against a shoulder 8*b* in the counterbored portion of the boss. The pinion 10 is in engagement with the rack 11 formed in the adjacent surface of the clamp bar 4.

A bushing 12 is fixedly mounted on the end of the spindle 9, a convenient method of mounting the bushing being by means of a key such as is indicated at 13. The bushing is threaded as indicated at 14 and a nut 15 is threaded onto the threads of the bushing 12.

The nut 15 has a handle 16 integrally formed therewith or threaded thereto. Other methods of rotating the nut 15 as by having holes therein with a detachable bar to fit within the hole or holes will readily occur to those skilled in the art.

Referring to Figure 4, it will be observed that the nut 15 mounted in the threads of the bushing 12 has a limited rotary movement, the normal position of the nut being such that a space as indicated at 16*a* in Figure 4 exists between the inner surface of the nut and the surface of the boss 7 of the housing.

The end of the spindle is threaded and to hold the bushing in fixed position on the spindle a nut 17 and washer 18 are secured on the end of the spindle.

Referring to Figures 4 and 4A, I have shown a preferred type of frictional interlocking dog. The dog consists of a cylindrical plunger 19 having a rounded face 20. The plunger is mounted in a cylindrical recess 21 in the nut 15 and a spring 22 engages the nut and tends to force the dog outwardly into contact with the inner surface of the annularly enlarged outer end of the bushing 12.

There is a detent recess 23 in the inner surface of the annularly enlarged end of the bushing and by comparing Figures 4 and 4A, it will be observed that after, by means of movement of the handle 16, the clamping jaw 4 has been moved into en-

gagement with the work, further movement of the handle 16 causes the dog 19 to be moved up the surface of the detent to the position shown at 20a in Figure 4a. This movement compresses the spring 22, but it also permits such movement of the nut 15 as will cause its surface to frictionally engage the surface of the boss 7 as indicated at 16b in Figure 4a. The spring tension of the dog 20 in the detent is sufficiently strong so that the rotation of the handle 16 normally rotates the shaft 9 and runs down the clamp 4 until the work is engaged. When the work is engaged further movement of the handle 16 causes relative movement of the nut 15 in the threads 14.

The relative rotation of the nut 15 in the threads 14 causes the inner surface of the nut to engage the outer surface of the boss 7 and the gap 16a becomes a frictional interlock as indicated at 16b in Fig. 4A. As this movement proceeds, the shaft 9 is pulled to the right and the shoulder 8a develops a frictional interlock against the counterbored shoulder 8b.

Thus there are two friction interlocks in opposed directions at 16b and 8b. The dog running up the inclined wall 20a causes the frictional interlocks to remain under compression. It should be understood that it is the blocking of further rotary movement of the shaft 9 which, as the movement of the handle 16 is continued, causes the dog to run up the detent. Thus the manual or other application of pressure which causes movement of the handle is cushioned by the flexible connection between the nut 15 and the bushing 12. The frictional interlock is only broken by counter-rotation of the handle 16, which rotation causes the parts to return to their normal operative position.

In Figures 5 and 6 the construction of the parts is substantially the same as in Figures 1 to 4, the exception being that instead of a detent as shown at 23 in Figures 4 and 4a, there is a cam surface 23a arranged in such manner that movement of the handle causes the dog to run up the cam surface 23a resulting in an interlock of the parts in exactly the same manner as in the first modification of mechanism which we have described.

A slightly different arrangement is illustrated in Figures 7 and 8 wherein the bushing does not have the annularly enlarged end as illustrated in Figures 4 and 4a, but instead has an annular portion 12a which has a cam surface 23b. In this modification there is a boss 24 having a cylindrically recessed portion 21a which receives the dog 19a. The dog is urged radially toward the axis of the spindle 9 by means of a spring 22a.

In the modification of Figures 7 and 8, after the handle has been rotated to cause clamping of the work, further movement of the handle causes the dog 19a to run up the cam surface 23b. This permits sufficient movement to close up the gap 16c and cause a frictional interlock between the inner surface of the nut and the outer engaging surface of the boss 7, to be opposed by the frictional interlock of the annular shoulder of the spindle with the counterbored recess in the boss.

It seems essential for the purposes of my invention that the mounting of the nut be such that a limited rotary movement of the nut is possible in the threads of the bushing, although, if it were possible to so construct the clamp, the bushing might be made as an integral part of the spindle. The limited movement of the nut in the threads of the bushing must also cause the nut to advance toward a position of frictional engagement with the surface of the boss, and this must be opposed by a frictional interlock of the shoulder on the spindle against an annular shoulder of the boss. The dog, which is spring pressed so as to ride up on a cam surface as soon as the clamping jaw engages the work, is radially spaced from the axis of the spindle 9.

The particular position of the dog which rides up the cam surface might be interchanged so that the dog is carried by the bushing and the cam surface is on the nut. Modification and rearrangement of parts to accomplish the same purpose will readily occur to those skilled in the art without departing from the principle of our invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A locking device for a rotatable shaft comprising a bushing having a threaded neck fixedly mounted on said shaft, a nut mounted for limited rotary movement on said threaded neck, a manually adjustable handle associated with said nut, and a spring actuated dog mounted in said nut in a position radially spaced from the axis of said shaft.

2. A locking device for a rotatable shaft comprising a bushing having a threaded neck fixedly mounted on said shaft, a nut mounted for limited rotary movement on said threaded neck, a manually adjustable handle associated with said nut, and a spring actuated dog mounted in said nut in a position radially spaced from the axis of said shaft, said spring actuated dog adapted to engage said bushing for causing a resiliently cushioned frictional interlock between said nut and bushing.

3. A locking device for a rotatable shaft comprising a bushing having a threaded neck fixedly mounted on said shaft, a nut mounted for limited rotary movement on said threaded neck, means for rotating said nut, and a spring actuated dog mounted in said nut in a position radially spaced from the axis of said shaft, said spring actuated dog having a resilient wedging action against portions of said bushing.

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