Nov. 22, 1955 H. PERSSON 2,724,295

QUICK CHANGE VISE HAVING JAW SUPPORTABLE ON FLAT SURFACE OF A MACHINE TOOL AND A SPINDLE ADJUSTABLE AND LOCKABLE IN PLANE PARALLEL TO SAID SURFACE

Filed Oct. 30, 1952 2 Sheets-Sheet 1

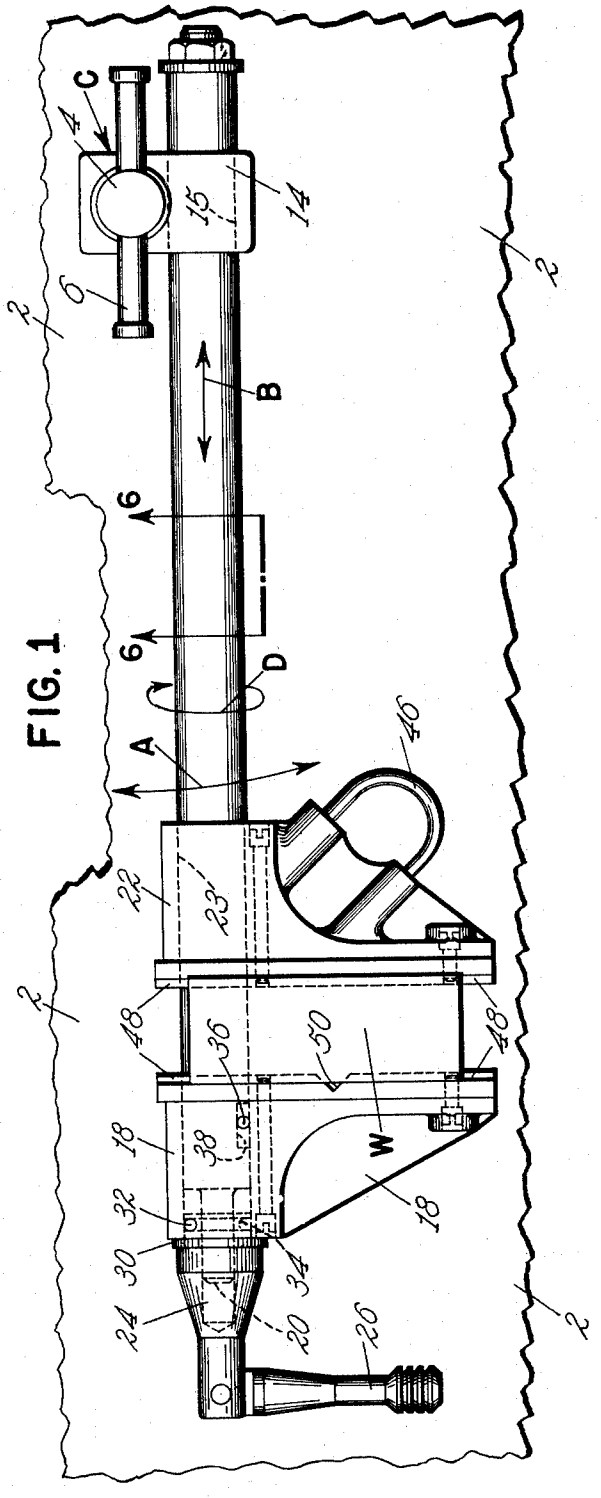


FIG. 1

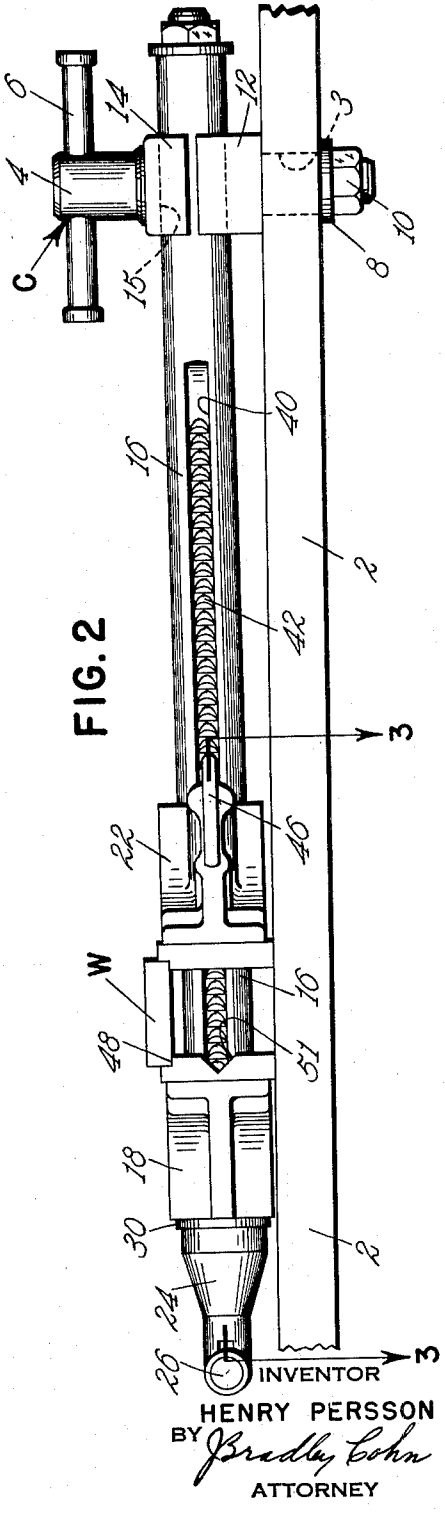


FIG. 2

INVENTOR
HENRY PERSSON
BY Bradley Cohn
ATTORNEY

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Filed Oct. 30, 1952 2 Sheets-Sheet 2

FIG. 3

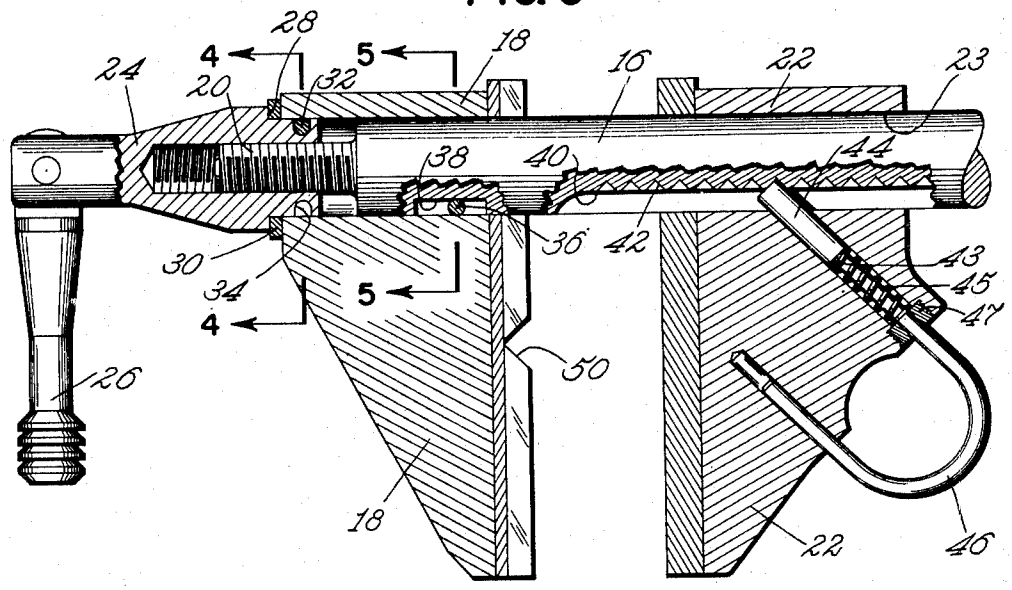


FIG. 4

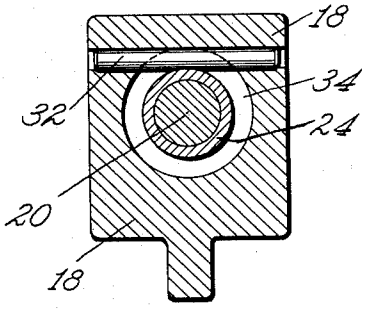


FIG. 5

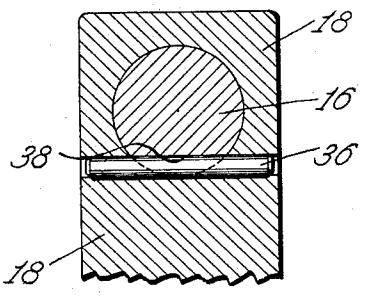
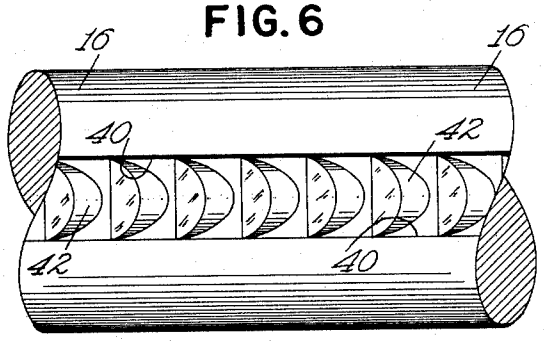


FIG. 6



INVENTOR
HENRY PERSSON
BY Bradley Cohn
ATTORNEY

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QUICK CHANGE VISE HAVING JAW SUPPORTABLE ON FLAT SURFACE OF A MACHINE TOOL AND A SPINDLE ADJUSTABLE AND LOCKABLE IN PLANE PARALLEL TO SAID SURFACE

Henry Persson, Bloomfield, N. J., assignor to Float-Lock Corp., a corporation of New Jersey

Application October 30, 1952, Serial No. 317,634

9 Claims. (Cl. 77—63)

This invention is directed to improvements in a work holding vise apparatus. The novel features of the invention pertain to a vise apparatus of the type shown in my Patent No. 2,552,580 and its reissue, Re. 23,519. This improvement consists of a novel ratchet and ratchet means for quick gross adjustment of one of the jaws and micro-screw adjustment of the other jaw.

It is an object of this invention to devise such a quick change adjustment on one of the jaws without requiring back-up of the jaw for release. This invention not only provides a quick means of adjusting the jaws to the size of the workpiece; the particular type of novel ratchet employed permits the quick movable jaw to be backed off the work as soon as the pressure on the work is released by the movement of the micro movable jaw, that is, the ratchet has no backlash and the movable jaw need not be moved in a forward direction to release it for a rearward movement.

A further object of the invention is an improved clamp member that holds the vise to the table of the drill press. I have improved this clamp member so that it provides a more efficient and strong locking action with the surface of the work table.

With reference to the accompanying drawings:

Fig. 1 is a plan view of the vise apparatus;

Fig. 2 is a side elevation of the vise in operative position exaggerating somewhat the angulation of clamp C that exerts downward pressure on the head or jaw end of the vise;

Fig. 3 is a sectional view of the jaws taken on line 3—3 of Fig. 2, showing the structure of the quick-change jaw and the micro-adjustable jaw;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 3; and

Fig. 6 is a partial showing of the keyway and ratchet taken along the line 6—6 of Fig. 1.

Referring to the drawings more in detail, the embodiment of my invention will now be fully described:

A support 2 is shown which may be in the table or bed of the machine tool, such as a drill press, a boring machine, or the like. A clamp C is mounted by a clamp bolt 4, which may extend through a hole 3 in the support 2, or it may be located in a T-slot thereof, and has a manually engageable bar 6 for turning the bolt. A washer 8 and nut 10 may be provided on the lower end thereof although a tap may be made in the hole 3 and bolt 4 screwed therein.

Lower and upper clamp members 12 and 14, respectively, are swingable on the bolt 4 and a spindle or shaft 16 is rotatable and slidable between said clamp members. As shown in Fig. 2, the clamp members in operative position form a bore 15 for engaging the shaft 16. This bore 15 is angled from right to left, slightly toward the support 2, as shown in Fig. 2. In actual practice, I have constructed the left end (toward the jaws) about $\frac{1}{5000}$ of an inch lower than the right end of the bore. Thus, when

the clamp is tightened, the shaft 16 is urged downwardly, pressing the jaws together against the support 2 for greater stability. In a small size float-lock this pressure has been estimated as high as two tons.

The parts are so arranged that the clamp member and spindle may swing back and forth as indicated by the arrow A (Fig. 1), while the shaft 16 may reciprocate relative to the clamp members as indicated by the arrow B and may rotate as indicated by arrow D.

A micro-movable distal jaw 18 is slidably mounted on shaft 16. The end of shaft 16 is turned down to form a threaded bolt or stud 20, as illustrated in Fig. 3. Mounted on this stud is a nut 24 with its manually engageable lever 26. Bearing surface 28 of this nut bears on a suitable washer 30 to engage the jaw 18 and urge it toward a proximal jaw 22.

With reference to Figs. 3 and 4, a pin 32 is positioned in a transverse hole in the jaw 18 to engage an annular groove 34 in nut 24. With reference to Figs. 3 and 5, a pin 36 is mounted in a transverse bore of jaw 18 to engage a flat longitudinal slot 38 of shaft 16. The pin 36 in slot 38 performs the twofold purpose of limiting the longitudinal movement of the jaw 18 along shaft 16 and of preventing rotation of the jaw about the shaft.

The proximal quick-change jaw 22 has a bore 23 by which it is slidably mounted on shaft 16. Shaft 16 is provided with a keyway 40. At the bottom of the keyway are located angular notches 42. As shown in Fig. 3, a spring-loaded pin 44 is slidably mounted in jaw 22 and engages keyway 40 and any selected indentation 42. Pin 44 by engaging the keyway 40 prevents rotation of the jaw about the shaft 16.

Referring to Fig. 3, it will further be seen that pin 44 successively engages notches 42 in pawl and ratchet fashion, and may be manually retracted from any selected notch 42 by means of a loop 46. The pin 44 is maintained in its tooth-engaging position by a coil spring 45 which, at its inner end, bears against a shoulder 43 on the pin 44 and, at its outer end, against a collar 47 which is threaded into the quick-change jaw 22. It will be noted that pin 44, because of its angulation, may be withdrawn without moving jaw 22, that is, there is no backlash on this pawl and ratchet structure. Furthermore, jaw 22 may be manually moved toward jaw 18, since pin 44 will skip over the teeth formed by the notches 42, the spring 45 being alternately compressed and expanded as the pin 44 is forced out of one notch 42 and slides into the next notch 42. The pin, of course, will not yield to jaw-spreading forces.

Adjacent inner sides of said jaws 18 and 22 are formed to have ledges 48 for supporting the workpiece, such as W. At least one of the jaws, such as 18, is provided with recesses 50 and 51 for gripping circular work.

In operation, the jaw 18 is backed off the shaft as far as will be permitted by the limit pin 36 (see Fig. 1). The workpiece W is located between the jaws and the jaw 22 quickly moved up into approximate gripping contact. Then a turn or so of the lever 26 moves jaw 18 into firm engagement with workpiece W. The jaws, with the contained workpiece, are then located in the position desired and the clamp C is tightened by a turn or so on the lever 6. This presses side faces or side-end face of the jaw, as the case may be, tight against the support 2, holding the vise tightly and frictionally in position. The slight angulation of the bore 15 in clamp C greatly increases the frictional grip of the jaws on support 2.

When it is desired to release the workpiece the clamp C is loosened and either the jaw 18 is backed up from the work or the pin 44 may be pulled out of its associated notch 42 and jaw 22 moved free of the work.

The invention may be embodied in other specific

forms without departing from the essential characteristics thereof. For example, any conventional key means may be used to prevent rotation of the jaws on said shaft or the shaft may be other than circular in cross-section where it supports the jaws, or vice versa, the jaws might be rotatable on the shaft and the shaft non-rotatable in the clamp means since rotation of the jaws is limited by the flat surfaces when the clamp C is in clamping position.

I claim:

1. Vise construction for the flat surface of a support of a machine tool comprising in combination, clamp members having adjacent shaft clamping faces and being movable towards and away from one another between shaft clamping and non-clamping positions, an elongated shaft rotatable and slidable between said clamp members when in non-clamping position, releasable securing means on which said clamp members are swingable for securing said clamp members to the support against swinging and for clamping said shaft against rotating and sliding movement, a distal jaw slidably mounted on one end of said shaft away from said clamp members, means engaging said shaft and said jaw to prevent rotation of said jaw about said shaft and to permit sliding movement along said shaft, vise jaw moving means on said shaft to move said jaw a limited distance along said shaft, a proximal jaw slidably mounted on said shaft, said shaft having a keyway, spaced notches in the bottom of said keyway, and a spring-loaded pin mounted in said proximal jaw to engage said keyway and selectively engage said notches, said pin being mounted at an acute angle co-planar with the axis of said shaft and away from said distal jaw, whereby said proximal jaw may be manually urged toward said distal jaw and said spring-loaded pin will yield to skip from one of said spaced notches to the next and said spring-loaded pin will not yield to forces urging said proximal jaw away from said distal jaw, and said clamp members, when secured, positioning said spindle substantially parallel to a flat surface of the support, the longitudinal axis thereof spaced a certain distance from the flat surface, and at least one of said jaws having at least one flat side surface disposed relative to the axis of said spindle at a distance equal to said certain distance.

2. Vise construction for the flat surface of a support of a machine tool comprising in combination, clamp members having adjacent shaft clamping faces and being movable towards and away from one another between shaft clamping and non-clamping positions, an elongated shaft rotatable and slidable between said clamp members when in non-clamping position, releasable securing means on which said clamp members are swingable for securing said clamp members to the support against swinging and for clamping said shaft against rotating and sliding movement, a distal jaw slidably mounted on one end of said shaft away from said clamp members, vise jaw moving means on said shaft to move said jaw a limited distance along said shaft, a proximal jaw slidably mounted on said shaft, said shaft having a keyway, spaced notches in the bottom of said keyway, and a spring-loaded pin mounted in said proximal jaw to engage said keyway and selectively engage said notches, said pin being mounted at an acute angle co-planar with the axis of said shaft and away from said distal jaw, whereby said proximal jaw may be manually urged toward said distal jaw and said spring-loaded pin will yield to skip from one of said spaced notches to the next and said spring-loaded pin will not yield to forces urging said proximal jaw away from said distal jaw, and said clamp members, when secured, positioning said spindle substantially parallel to a flat surface of the support, the longitudinal axis thereof spaced a certain distance from the flat surface, and at least one of said jaws having at least one flat side surface disposed relative to the axis of said spindle at a distance equal to said certain distance.

3. Vise construction for the flat surface of a support of a machine tool comprising in combination, clamp members having adjacent shaft clamping faces and being movable toward and away from one another between shaft clamping and non-clamping positions, an elongated shaft rotatable and slidable between said clamp members when in non-clamping position, releasable securing means for securing said clamp members to the support and for clamping said shaft between said clamp members against rotating and sliding movements, a distal jaw slidably mounted on one end of said shaft, a screw thread cut into said end of said shaft, a member having complementary screw thread means mounted on the end of said shaft and engaging said distal jaw to move it along said shaft substantially the length that said member may move on said screw thread, a proximal jaw slidably mounted for movement along said shaft toward and away from said distal jaw, said shaft having spaced notches therealong, a spring-loaded pin mounted in said proximal jaw to engage selectively said notches at an angle obtuse to the axis of said shaft from said distal jaw whereby when said proximal jaw is urged toward said distal jaw the pin will automatically yield to permit said pin to skip from one of said notches to the next and said pin will not yield when opposite forces are exerted on said proximal jaw.

4. Vise construction for the flat surface of a support of a machine tool comprising in combination, a shaft, a clamp engaging said shaft, said clamp having two clamping faces movable toward and away from the other, said clamp members when in clamping position defining a bore wherein said shaft is engaged, said bore having its axis slightly out of parallel to the flat surface, one end of said bore being slightly nearer said flat surface than the other end, vise jaws mounted on said shaft, at least one of said jaws being slidable toward and away from the other, said clamp member, when secured, positioning said shaft substantially parallel to the surface of the support with the longitudinal axis thereof spaced a certain distance from the flat surface and urging the end on which said jaws are mounted toward said flat surface and at least one of said jaws having at least one flat surface disposed relative to the axis of said spindle at a distance equal to said certain distance.

5. Vise construction for the flat surface of a support of a machine tool comprising in combination, a pair of vise jaws, a shaft on which said jaws are movably mounted, clamp members to grip said shaft against rotative and sliding motion and releasable securing means on which said members are swingable for securing said clamp members to the support against swinging and in shaft clamping position, said clamp being characterized by a shaft engaging bore defined by said clamping members, the longitudinal axis of said bore being spaced substantially a certain distance from the flat surface of said support and being slightly nearer said flat surface at the end toward said vise jaws, one of said vise jaws having micro-adjustable vise jaw moving means, said shaft having a keyway and spaced notches therealong, said other jaw having key means engaging said keyway to prevent rotation of said jaw on said shaft and means yieldably engaging selectively said spaced notches for grossly setting said other jaw toward and away from said one jaw.

6. Vise construction for the flat surface of a support of a machine tool comprising in combination, a shaft, spaced notches along said shaft, a screw-threaded stud on one end of said shaft, a distal jaw slidably mounted on said shaft, a threaded nut screwed on said threaded stud and engaging said distal jaw to move it back and forth, a proximal jaw slidably mounted along said shaft for adjustment toward and away from said distal jaw, a spring-loaded pin in said proximal jaw and engaging selectively said spaced notches so that said proximal jaw may be adjusted at fixed positions toward and away from said distal jaw, and clamping members having adjacent shaft clamping faces and being movable toward and away

from one another between shaft clamping and non-clamping positions.

7. Vise construction for the flat surface of a support of a machine tool comprising in combination, a shaft, spaced notches along said shaft, a screw-threaded stud on one end of said shaft, a distal jaw slidably mounted on said shaft, a threaded nut screwed on said threaded stud and engaging said distal jaw to move it back and forth, a proximal jaw slidably mounted along said shaft for adjustment toward and away from said distal jaw, a spring-loaded pin in said proximal jaw and engaging selectively said spaced notches, said pin forming an angle with the longitudinal axis of said shaft, said angle being obtuse toward said distal jaw so that when said proximal jaw is urged toward said distal jaw said spring will be alternately compressed and expanded as said pin slides into and out of successive notches and said pin will engage selectively said notches to resist forces of the opposite direction on said proximal jaw so that said proximal jaw may be adjusted to various fixed positions as it is moved toward and away from said distal jaw, and clamping members having adjacent shaft clamping faces and being movable toward and away from one another between shaft clamping and non-clamping positions.

8. Vise construction for the surface of a support of a machine tool comprising in combination, a shaft having vise jaws slidably mounted thereon, one of said jaws being micro-movable therealong, the other of said jaws having macro-adjustable means to set said jaw in fixed positions therealong, said macro-adjustable means including a longitudinally yieldable pin and complementary means on said shaft to be engaged by said pin to resist movement of said other jaw away from said one jaw, said yieldable pin yielding longitudinally on movement toward said one jaw, clamp members having adjacent shaft clamping faces, said faces defining a bore for engaging said shaft, the longitudinal axis of said shaft when in said clamping means being positioned from the surface of said support a certain distance and at least one of said jaws having a flat side surface spaced from said axis said certain distance whereby rotation of said jaw is prevented when said clamping members are in clamping position.

9. Vise construction for the flat surface of a support of a machine tool comprising in combination, a shaft secured in spaced position from said flat surface and substantially parallel thereto, vise jaws slidably mounted on said shaft and movable toward and away from each other, one of said jaws having micro-movable vise type moving means, said shaft having spaced notches therealong, a spring-loaded pin mounted in the other of said jaws to engage selectively said notches at an angle obtuse with that part of the axis of said shaft extending toward said micro-adjustable jaw whereby when said other jaw is urged toward said first-named jaw said pin will automatically yield to permit said pin to skip from one of said notches to the next and said pin will not yield when opposite forces are exerted on said other jaw.

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