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QUICK ACTING WRENCH OR OTHER CLAMPING DEVICE

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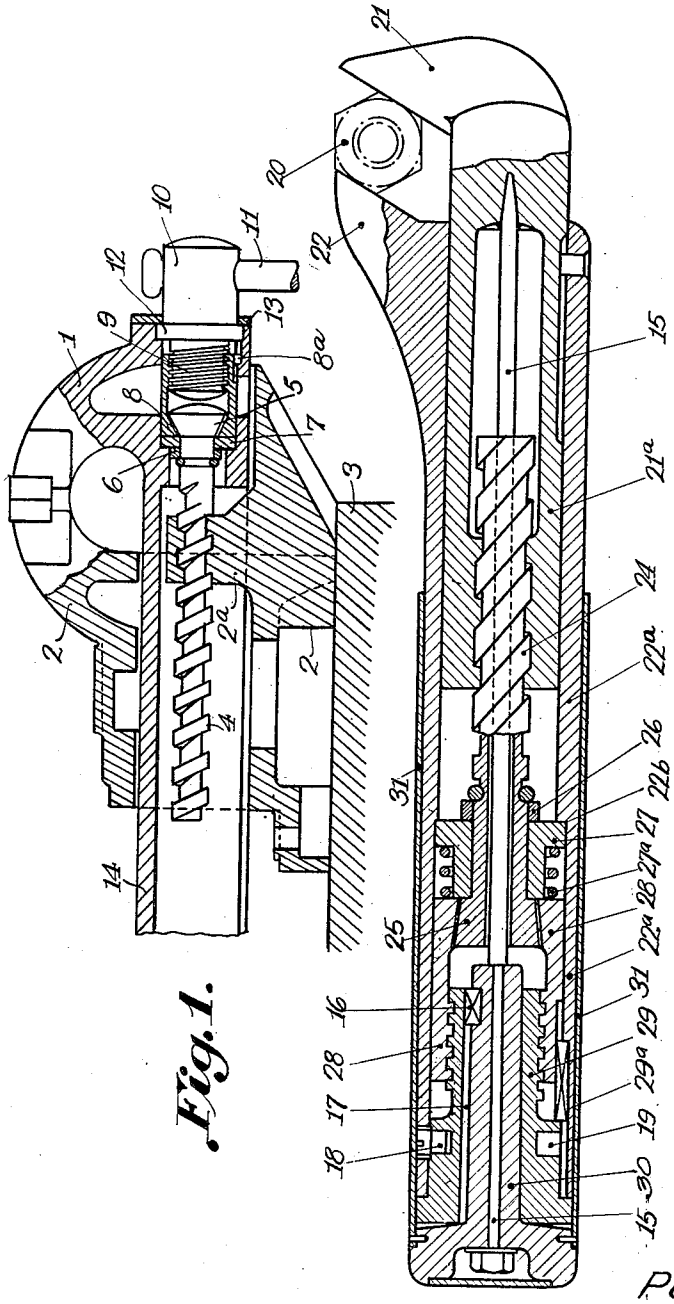


Fig. 1.

Fig. 2.

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QUICK ACTING WRENCH OR OTHER CLAMPING DEVICE

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4 Claims. (Cl. 81—155)

This invention relates to a vise, adjustable wrench or other clamping and holding tool having jaws movable freely lengthwise under a pull or direct pressure which may be locked instantaneously in any position by a slight swing of the handle, for instance through 90°.

The guide acting tool according to this invention comprises a spindle having a high pitched thread engaging the inner thread on one of the jaws, said spindle may be locked in any angular position by means of a friction cone or the like, which is displaced longitudinally by turning a second threaded member having a low pitched thread.

It is an object of this invention to provide a tool of the abovesaid kind, in which the handle for actuating the friction cone or the like serves also as operating means for the longitudinal displacement of the jaws, which permits manipulation with one hand and makes it easier. The workman may hold the piece with one hand between the two jaws while with his other hand he approaches or recedes the jaws from each other and locks or unlocks them without abandoning the operating member.

It will be appreciated that the invention may be applied to any suitable embodiment, two preferred forms of which are illustrated by way of example in the annexed drawing.

Fig. 1 is a longitudinal section of a vise with movable front jaw in which the quick locking means is located.

Fig. 2 shows by way of example an adjustable wrench according to this invention.

With reference to Fig. 1, the movable jaw 1 is arranged in front and the rear jaw 2 is secured to the support 3. An internal projection 2a of the fixed jaw 2 is provided with a high pitched female thread. A central spindle 4 having a conical head 5 and a thrust washer 7 fitted between the conical head 5 and a clamping ring 6 is threaded into the nut formed by said projection 2a. The spindle 4 is journaled by means of said washer 7 in a cylindrical recess of the movable jaw 1; said recess houses also a sleeve 8 which is displaceable endwise but prevented against rotation by a key 8a. The portion of the sleeve 8 surrounding the conical head 5 is provided with a corresponding inner conical friction surface and, on its opposite side, with a low pitched thread into which a screw 9 secured to the support 10 of the handle 11 is threaded.

The member 9, 10 carries a collar 12 and turns therewith, while being prevented from longitudinal displacement, in a circular groove provided on the inner face of the movable jaw 1 and is guided in said movement by means of an annular cover plate 13. The spindle 4 is protected in all positions of the movable jaw 1 by a casing 14 integral with the movable jaw.

In the disengaged position shown in Fig. 1, where a small play occurs between the two conical surfaces of the members 5 and 8, the movable jaw 1 may be moved quickly by pushing or pulling lengthwise the support 10 by means of the handle 11 thus adjusting the distance between the two jaws to the piece to be set up. During these movements the high pitch of the threads of the spindle 4 and nut 2a allows rotation of the spindle and its endwise displacement in regard of the fixed jaw, the washer 7 acting as a thrust-bearing member of the spindle 7 in both directions of displacement. Notwithstanding the play however small between the two conical surfaces required for turning the spindle 4, the washer 7 may transmit the thrust and pull to the spindle 4, being held against the shoulder of the movable jaw by the friction cone 8. As soon as the position determined by the piece is reached, the thickness of this latter preventing any further longitudinal displacement, the friction cone member 8 is moved to the right by rotation of the screw 9 produced by a slight swing of the handle 11 through the small space between the two conical surfaces, whereupon it tightens the conical head 5 thus locking the spindle 4 in its angular position and, consequently, the movable jaw with relation to the fixed jaw. Each further swinging of the handle 11 will produce a movement of the support 10 to the left and said support by means of its collar 12 will force the movable jaw 1 to approach the piece and tighten it.

In accordance with this axial displacement a clearance will be formed between the washer 7 and the inner shoulder of the movable jaw.

When it is desired to loosen the piece the friction cone member 8 is moved to the left also through a very small arc of movement in the opposite direction of the handle 11 and is removed from the conical head 5, so that the movable jaw is again free to be displaced longitudinally while the washer 7 being locked between the cone 8 and the inner shoulder of the movable jaw 1 can withstand the thrust of the spindle 4 in both directions. It will be noted that the washer 7 in its locked position is released from any strain.

The constructional form shown in Fig. 2 is particularly adapted for the application of the in-

vention to adjustable wrenches and similar tools.

The movable jaw 21 is fitted by means of its tubular projection 21a in the tubular projection 22a of the fixed jaw 22. A rod 15 is secured to the jaw 21 and passes through the hollow threaded spindle 24, screwed into the projection 21a of the movable jaw, a support 30 for a tubular handle 31 is rotatably mounted on the lower end of the rod 15; the tubular handle 31 is fitted on the projection 22a of the fixed jaw. The support 30 is connected by means of a sliding key 16 to the low pitched screw 29 guided in the projection 22a by a pin 18 and annular groove 19 in such a manner as to be free to rotate but prevented from longitudinal displacement with respect to the screw 29. The low pitched screw 29 is threaded into the friction cone member 28 acting in turn on the conical head 25 of the spindle 24. A key 29a on the tubular projection 22a guided in a groove on the member 28 prevents any relative rotation between the members 28 and 22a. The thrust washer 27 fitted between the conical head 25 and the clamping ring 26 on the spindle 24 is provided with a shoulder on which bears one of the ends of a relatively strong coil spring 27a resting at its other end on the front surface of the friction cone member 28. An inner shoulder 22b of the tubular casing 22a serves as a stop for the thrust bearing on ring 27.

The threads in the projection 21a and on the spindle 24 are high pitched.

In the position shown in Fig. 2, that is to say when the conical head 25 is removed from the friction cone member 28, the distance between the jaws 21 and 22 may be varied by displacing the tubular handle 31, and consequently, the jaw 21 lengthwise. The high pitch of the spindle 24 allows rotation of the latter upon reciprocation of the parts 21, 21a produced by the movement of the handle 31 acting upon 21, 21a through the parts 30 and 15. On pushing the jaw upwards, the thrust from the spindle 24 to the jaw 22 is transmitted by the upper edge of the head 25 through the washer 27 to the inner shoulder 22b on the portion 22a of the jaw 22. On pulling the jaw 21 downwards, said thrust is transmitted by the clamping ring 26 to the upper edge of washer 27 and by the lower edge of the latter to the sleeve 28 and through the screw 29 to the pin 18 in the portion 22a of jaw 22. When the position corresponding to the thickness of the nut 20 between the jaws is reached, the handle 31 is rotated with relation to the projection 22a. This rotation is transmitted through the support 30 and key 16 to the screw 29 threaded into the friction cone 28 thus producing a downward displacement of the friction cone 28 prevented from rotating by the key 29a, tightening of the conical head 25 and locking of the spindle 24 against angular displacements. As long as angular displacements of the spindle 24 are prevented, any endwise movement of the part 21, 21a or movable jaw is made impossible.

Before the friction cone on the member 28 comes into contact with the conical head 25, the play between the two conical surfaces must be taken up and this causes the front surface of the cone member 28 to recede a short distance from the ring 27 and the spring 27a to be slightly stretched, this latter continuing to hold the ring 27 against the stop 22b until the play is taken up. By this arrangement even when the nut 20 is released from the jaws the distance between the jaws will not be altered by a slight blow on the jaw 21; which is very convenient when it is desired to place again the nut 20 or another nut of the same size between the jaws and is possible owing to the fact that the spring 27a maintains the two conical surfaces in contact with each other even when the nut has been removed, so that a blow on the jaw cannot displace it unless it is so strong as to overcome the tension of the spring 27a. Practically in order to displace a jaw with relation to the other it is necessary to rotate the outer casing 31 and move the cone member 28 backwards to an extent equal to that which had been necessary for locking the spindle 24.

A similar arrangement may also be applied to the vises according to this invention.

What I claim is:

1. An adjustable wrench, vise or other clamping device of the character described, comprising the combination, with a fixed jaw and a longitudinally displaceable jaw, one of said jaws being provided with an internal high-pitched thread, of a threaded spindle engaging said internal thread, a friction locking member in the other jaw for locking said spindle in any angular position, a low pitched screw rotatable in said other jaw independently of said spindle and controlling said locking member, a handle positively connected for rotation with said low-pitched screw, and for longitudinal displacement with the movable jaw, and thrust bearing means disposed between said spindle and one of the jaws for permitting longitudinal displacement of the movable jaw in opposite directions.

2. An adjustable wrench, vise or other clamping device of the character described, comprising the combination, with a fixed jaw and a longitudinally displaceable jaw, the fixed jaw being provided with an internal high pitched thread, of a threaded spindle engaging said internal thread and having an enlargement at one end thereof, thrust bearing means operatively engaged between said enlargement and said movable jaw to limit longitudinal displacement of the spindle, thrust bearing means disposed between said spindle and the movable jaw for permitting longitudinal displacement of the movable jaw in opposite direction, a friction locking member free to be displaced in the movable jaw for locking said spindle in any angular position, a low pitched screw rotatable in the movable jaw independently of said spindle and controlling said locking member and connected for endwise displacement with the movable jaw, a handle, and a support for said handle, said support being solidly connected with said low pitched screw.

3. An adjustable wrench, vise or other clamping device of the character described, comprising the combination, with a fixed jaw and a longitudinally displaceable jaw, the fixed jaw being provided with an internal high pitched thread, of a threaded spindle engaging said internal thread, thrust bearing means disposed between said spindle and the movable jaw, a conical head on said spindle converging towards the threaded part of the spindle, a hollow member in the movable jaw, which is free to be displaced endwise with respect to said movable jaw, and has an inner conical surface portion at one end thereof cooperating with said conical head, and an internal low-pitched thread, there being means preventing rotation of said movable jaw with respect to said hollow member, a screw engaging the thread in said hollow member and journaled in the movable jaw and rotatable in-

dependently of the spindle, and a handle operatively connected with said screw.

4. An adjustable clamping device of the class described comprising a fixed jaw, and a jaw movable with respect thereto, the movable jaw having a high-pitched screw thread in the shank thereof, the fixed jaw having a recess therein, a hollow threaded spindle having an enlarged portion, and engaging said high-pitched thread, a friction locking member having low pitched threads thereon, and displaceable endwise in said recess and cooperating with said enlarged portion to lock said spindle in any angular position, thrust bearing means operatively engaged between said enlarged portion and said fixed jaw, means for preventing the locking member from rotating in said recess, a low pitched screw cooperating with said low pitched threads and rotatable in said recess independently of said spindle, a handle operatively connected with said low pitched screw and rotatable therewith, and a rod passing through said hollow spindle and connected to said handle and movable jaw.

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