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ADAPTABLE JAWS PLIER

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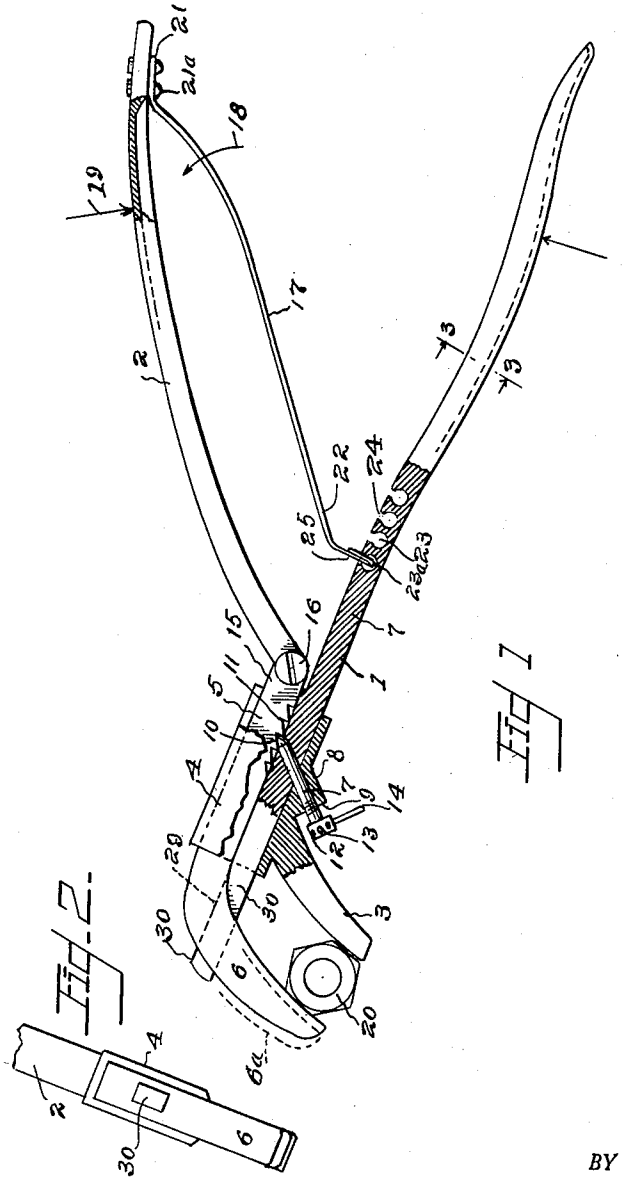


Fig. 1

Fig. 2

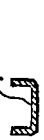


Fig. 3



Fig. 4

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ADAPTABLE JAWS PLIER

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5 Claims. (Cl. 81—362)

This invention relates to pliers of a type presenting two jaws carried on pivoted handles and operating to clamp any part, for example, a nut that is being screwed down on a bolt or the like.

An object of the invention is to provide a plier such as referred to, with means operating when pressure on the handles is relaxed, to open the jaws automatically. This enables a machinist holding the plier to shift the plier to a second position, oriented with respect to the axis of the nut, and applied to another pair of opposite faces of the nut to rotate it again through the same angle as before.

This mode of operation enables a nut to be rotated quickly to its seat with an action simulating the "ratcheting" movement that can be obtained with a ratchet-and-pawl assembly often used in machine shop practice.

Another object of this invention is to provide means between the handle-members of the plier to enable the relation of the spring to the handle-members to be altered as desired to regulate the force that the spring will exert in the direction to increase the space between the jaws of the plier.

Another object of the invention is to provide means for clamping the relatively movable jaw against a part, e. g. a nut held in the plier. This facility can function independently of the relative position of the handle-members.

This involves the use of a set-screw or similarly threaded device that is mounted in an abutment projecting from the relatively fixed jaw of the plier. The threaded device is mounted preferably so that its axis extends substantially parallel to the longitudinal axis of the relatively fixed jaw, and one of the objects of the invention is to provide means associated with the head of the set screw to facilitate its rotation while presenting opportunity to employ a lever on the set-screw.

Further objects of the invention will be evident from a careful reading of the specification and study of the accompanying drawing.

The invention consists in the novel parts and combinations of parts to be described hereinafter, all of which contribute to produce an efficient adaptable jaws plier.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Figure 1 is a side elevation of a plier embodying my invention, portions of which are broken away to disclose preferred details of the invention.

Figure 2 is an end view of the jaws of the plier. This view is broken away, and is projected on a plane disposed substantially at right angles to the longitudinal axis of the relatively fixed handle-member of the tool.

Figure 3 is a cross-section on the line 3—3 of Figure 1; and

Figure 4 is an edge elevation of the end of a flexion spring that I prefer to employ between the handle members of the tool; this view illustrates the preferred shape of the end of this flat spring that co-operates with a series of means such as sockets in the adjacent face or edge of the relatively fixed handle-member when desirable to change the position of its connection to the spring, to obtain greater or less expansion of jaws.

The plier illustrated and embodying my invention, includes two lever form handle-members 1 and 2. The former carrying the relatively fixed jaw 3. While this jaw can be integral with the handle member 1, I prefer to form it on a sleeve 4 which operates as a guide for the shank 5 of the relatively movable jaw 6. This sleeve is of rectangular cross-section.

The jaws are preferably disposed in an inclined position with respect to the longitudinal axis of the handle-member 1.

Means is provided for securing the sleeve 4 to the handle-member 1, and at the same time forcibly tightening the jaw 6 against any part that is held between the jaws. For this purpose it is preferable to provide a set-screw 7, which may be mounted in an integral abutment 8 on the jaw 3, that presents a face 9 disposed substantially at right angles to the direction in which the jaw 3 extends to facilitate tapping a hole through it for the set-screw. This set screw has a tapered tip 10 that can be received in any one of a series of notches 11 in the adjacent edge of the shank 5, after passing through the handle-member 1.

By tightening up the set-screw its tapered tip 10 may project into any one of the notches 11, each having an inclined face and an abrupt face, as shown, to conform to the shape of the tip 10. Of course, when the set-screw is not being used for this purpose it must be adjusted back to hold its tip clear of the side of the shank.

In order to facilitate tightening the set-screw it preferably has a capstan type head 12 with a plurality of small sockets 13 spaced around in its side, any one of which may receive the end of a small removable handle bar or pin 14 that can be applied to any one of the sockets that will permit rotation of the pin through an arc on the side of the set screw remote from the jaw 3.

This pin 14 gives a considerable leverage in tightening the set-screw and although this pin is shown in place for rotating the set screw, it should be said that when the pliers are in use it will be kept in a convenient place.

The end 15 of the shank 5 projects beyond the adjacent edge or end of the sleeve 4, at which point the forward end of the handle member 2 is secured by means of a machine screw 16 which operates as a pivot of rotation for this handle member, and as a stop against the sleeve 4 to limit the forward movement of the shank 5.

As shown in Figure 1, the handle-members diverge from each other toward their rear ends. In this angle between them I provide resilient means preferably in the form of a flexion spring 17 that exerts a force in the direction indicated by the arrow 18 adjacent the end of the handle-member 1; and this force, when pressure is relaxed upon the handle-members, indicated at the arrows 19, effects movement of the shank end 15 and the pivot 16 toward the sleeve 4. This will move the jaw forward and shift the jaw 6 away from any piece, such as a nut 20, that may be held between the jaws of the plier. This feature enables a person using the plier to attain an effect that simulates a ratcheting effect, by relaxing the grip of his hands on the two handle-members. This will cause the jaws to move slightly apart so that they are not gripping the piece or nut, as when rotating it, on its axis. As soon as the jaws are freed in this way, the operator of the plier simply slips the jaws over two other opposite faces of the nut, then tightens his grip as he swings the plier on the axis of the nut. Evidently, this

faculty of the plier can be utilized to screw a headless stud into its threaded socket.

Another feature in the mode of operation of this plier is that, pulling the handle-member **2** toward the handle-member **1** at the same time gripping force is applied to the handles insures that a considerable turning moment can be exerted by the jaws on the piece that is clamped.

This capability of the plier results by reason of the fact that the upper and outer end portion **21** of the spring **17** has its concave side disposed toward the handle-member **2**.

This reaction of the spring is accomplished because of the way in which the forward end portion **22** of the spring is attached to the handle member **1**.

This is effected preferably by providing a series of sockets **23** in the upper face or edge of the handle member **1**, and by forming these sockets with relatively narrow throats **24** through which a rigid shank portion **25** of the spring is inserted. This shank portion **25** is preferably disposed at an obtuse angle or bend at **26** with respect to the body portion of the spring; and stiffening the shank by forming a return bend **27** at its extreme end so as to double the thickness of metal at this location, with the extreme end portion **28** overlying the body.

By having a series of these sockets **23** the action of the spring may be altered, as also will be the distance between the adjacent faces of the jaw **3** and **6** when the plier's parts are in their position of rest. The maximum possible opening of the jaws would be attained with the shank **25** in the foremost socket **23***a*, and in the position of rest of the plier the pivot head **16** would be held up against the adjacent end of the sleeve **4**.

While sockets similar to the sockets **23** could be placed in the handle-member **2**, instead of the handle-member **1**, I prefer to place them in approximately the position shown on the handle-member **1**, as shown on the drawing.

If desired, the weight of the handle members may be reduced by giving them the flanged type of cross-section or channel-form whenever this form will not interfere with other features of the tool.

The outer end **21** of the spring **17** is bent so as to lie flat against the inner face of the handle-member **2**, to which it is attached with rivets **21***a*.

In order to provide an additional guide and reinforcement for the jaw **6**, I provide a slot **29** passing through the jaw **6**, and form a blade-like extension **30** on the end of the handle-member that fits into this slot. This should be a neat machine fit, however, in order to obtain a bracing effect.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

I claim as my invention and desire to secure by Letters Patent:

1. In a plier, the combination of a first handle member, a laterally extending first jaw supported thereon adjacent its forward end, a second jaw opposed to the first jaw and guided to slide on said first handle member, said jaws having cooperating faces for holding a nut or the like between the same; a second handle member pivotally connected to the second jaw, said handle members having diverging end portions operating, when pressed on their outer sides to clamp such nut for rotating the same on its thread, and a spring link between the handle members and having one end secured to the first handle member intermediate its ends and its other end secured to the second handle member adjacent its free end, said link exerting its force in a direction to separate said handle members, thereby enabling the relaxing of the pressure on the handle members to facilitate the operator's applying the jaws in a different position for imparting a second rotation to the nut.

2. A plier according to claim 1, in which the second jaw includes a guide slot, and one end of the first handle member includes a tongue extending through said slot in the second jaw for bracing the same.

3. A plier according to claim 1, including socket means on one handle member and facing the other handle member, said socket means including a series of individual sockets disposed along said one handle member, and in which an end of the spring adjacent the sockets is bent back upon itself to form a tongue to be received in any one of the sockets.

4. A plier according to claim 1, including means for securing the first jaw to the first named handle-member, said securing means comprising a set-screw carried by the first jaw and passing through the first handle member, and a plurality of sockets co-operating with the set-screw and formed in the shank of the second jaw to co-operate individually with the set-screw.

5. A plier according to claim 4, in which the first jaw has a lateral abutment carrying said set-screw; the set-screw having a capstan type head with a plurality of sockets in its periphery, a removable bar type driving handle for the set-screw, and said removable handle having a tip selectively of fitting said head sockets.

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