June 22, 1937. C. A. ERICKSON 2,084,633

ADJUSTABLE PLIERS

Filed Jan. 31, 1935

FIG. 5.

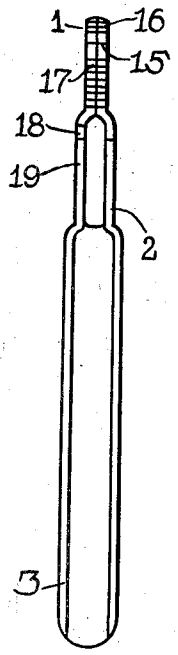


FIG. 1.

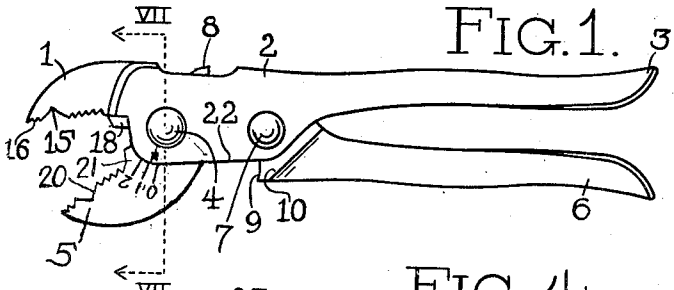


FIG. 4.

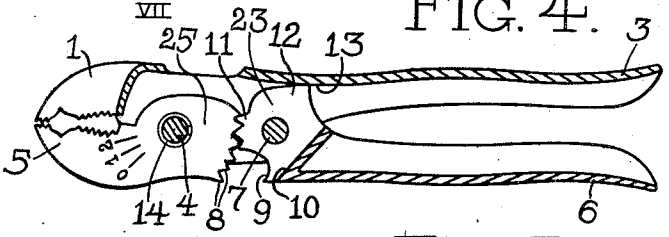


FIG. 3.

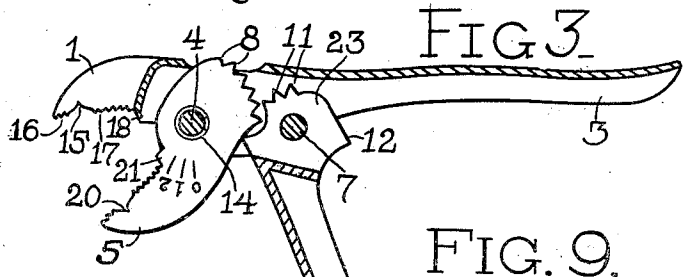


FIG. 7.

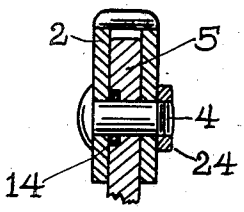


FIG. 10.

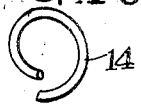


FIG. 9.

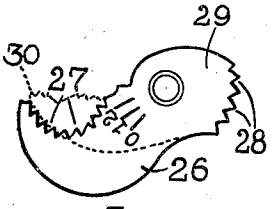
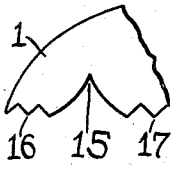


FIG. 8.



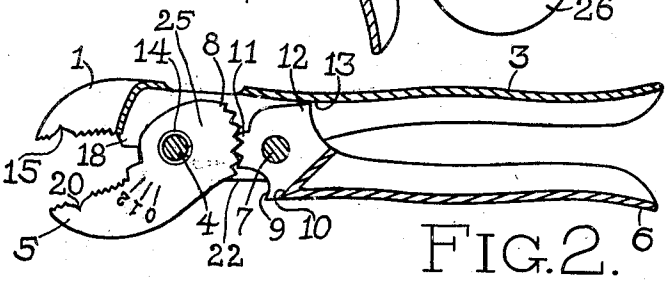
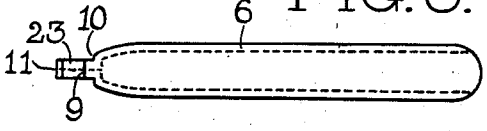


FIG. 2.

FIG. 6.



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ADJUSTABLE PLIERS

Carl Arvid Erickson, Brooklyn, N. Y.

Application January 31, 1935, Serial No. 4,372
In Sweden April 15, 1933

5 Claims. (Cl. 81—46)

This invention relates to so called gas pliers or similar tools wherein one shank or handle is rigid with one jaw while the other handle and jaw are independently pivoted to the first handle and jaw assemblage, the latter handle and jaw being capable of being mechanically connected so that the handle may be used to open and close the jaw in different positions of relative adjustment.

The main object of my invention is to provide a plier or such tool as indicated, wherein it is possible to quickly and easily alter the size of the opening between the jaws in order to render the tool suitable to grip different sizes of pipes, nuts, bolts and the like.

Another object is to make a tool of this character which can be manufactured at a very low cost because of its ease of manufacture and its simple form.

A further object is to have such a tool wherein it is possible to change one of the jaws and interchange the same with any one of a series of jaws of different sizes or characteristics.

It is also an object of my invention to provide a tool of the mentioned class wherein safeguards have been incorporated in the very design of the handles and the jaws to prevent misoperation or lack of positive connection between the independently pivoted handle with the independently pivoted jaw when the handle is brought toward the other handle for the purpose of closing the jaws.

Another object again, is to furnish such a tool with indicating means by which to note beforehand which of the possible positions the independently pivoted jaw should assume in order to grip any predetermined size of pipe or bolt, etc.

It is in addition also an object to provide the independently pivoted handle member of the mentioned class of tools with a plurality of stops or shoulders to control the adjustments and operation of the tool as a whole and said handle and the independently pivoted jaw in particular.

Other objects and the various advantages inherent in my invention will appear more fully in detail as this specification proceeds.

In the accompanying drawing forming part hereof,

Figure 1 is a side elevation of a tool made according to my invention and embodying the advantageous features thereof in a practical form, the handles being in closed position while the jaws are adjusted for the widest size of gap.

Figure 2 shows a sectional elevation of the same tool when the jaws are adjusted for a slightly smaller size of gap.

Figure 3 is another sectional elevation showing the handles and jaws opened or displaced to their extreme open positions wherein they may be relatively adjusted for any one of a range of sizes of gap between the jaws when the latter are closed subsequently.

Figure 4 is a sectional elevation of the tool when the handles and jaws are fully closed.

Figure 5 illustrates one of the shanks or handle members of the tool as seen from the inside.

Figure 6 shows the independently pivoted or movable handle in side elevation.

Figure 7 is a transverse section through the tool of Figure 1 on line VII—VII, upon an enlarged scale.

Figure 8 is a fragmentary view of a jaw detail on a similar enlarged scale.

Figure 9 illustrates another form of the independently pivoted jaw, forming one of a series of interchangeable jaws.

Figure 10 is a view of the coil spring shown in section in Figure 7.

Throughout the views, the same reference numerals indicate the same or like parts.

In the practice of my invention, one jaw 1, an intermediate portion 2 and one handle 3 are all made integral, and may readily be stamped and formed from sheet metal of appropriate thickness or else drop forged or even cast of suitable metal. The intermediate portion forms a kind of housing through which pivots may extend transversely and into which a movable jaw and a movable handle may be inserted. Hence, a movable and independently pivoted handle 6 has a flat end or sector 23 extending into the intermediate portion 2 and is pivoted in permanent association therewith by means of a pin or bolt 7, about which the handle is freely swingable. This movable handle has an upper stop portion 12 which abuts against the inner surface 13 of the intermediate portion 2 of handle 3 and provides a limit determining the closed position of the movable handle with respect to the first handle 3. The sector 23 of the movable handle is toothed at 11, but the extent of the teeth thereon is quite limited in order to allow ample clearances for various adjustments of the handle and a sufficient range of movement.

On the other hand, a movable jaw 5 has a sector which is toothed at 8, while a bolt or threaded pin 4 passes through the same and the intermediate handle portion 2 to form a pivot for said jaw. In order to provide a slight amount

of friction which will prevent the jaw from dropping loosely to a low position out of control, a loop or single coil spring 14 is inserted in a counterbored portion of said jaw about bolt 4 and frictionally tends to hold the jaw and bolt in any attained position of partial rotation of the jaw with respect to said bolt. The teeth 8 of the sector portion of the jaw 5 are adapted to engage wtih the teeth 11 of the handle sector 23, so that upon partly opening handle 6 away from handle 3 or closing the same, the handle will, by its teeth 11 meshing with teeth 8 of jaw 5, cause the latter to move about its pivotal mounting 4 so as to open and close according to the movements of said handle.

Handle 6 has a stop projection 9 which abuts against the movable jaw 5 when both the handle and jaw are swung down to extreme open positions, the projection 9 serving to limit the movement of the handle on the one hand, and the movement of the jaw 5 on the other hand. The extreme position illustrated in Figure 3 brings out the fact that the projection 9 is so designed as to size in proportion to the sizes of the sectors and the teeth thereon, that the teeth 11 of the handle sector 23 will always mesh with the teeth 8 of the movable jaw 5 when the movable handle 6 is moved or closed toward the rigid handle 3. The movable jaw is prevented from swinging out more widely than as indicated in Figure 3, by the engagement of the inner portion of sector 25 of said jaw against the upper portion of intermediate part 2, so that said movable jaw is thus limited to move between said extreme position and closed position in which the jaw is closed against rigid jaw 1.

However, the purpose of the extreme open position of both the movable jaw and handle is to provide for both an adjustment clearance position, in which it is possible to alter the initial position of the jaw 5 relatively to handle 6. If a very large object is to be gripped by the tool, the jaws may well be adjusted to their largest possible opening as in Figures 1 and 3, and in order to definitely identify each of several relative positions which the movable jaw can assume initially while handle 6 is in extreme open position, an arrow or other indicating mark is stamped or inscribed upon intermediate portion 2, while upon the jaw itself a plurality of marks such as 0, 1, 2, etc., with leader lines from the same toward said arrow may be inscribed. If the parts are in the positions shown in Figure 3 and handle 6 closed up toward rigid handle 3, the teeth of handle sector will immediately mesh with the teeth of jaw sector 25 in the widest relative positions of the jaws, so that when the movable handle has been closed as in Figure 1, the movable jaw will have closed somewhat to approximately the widest closed position indicated in Figure 1. In the initial open position, the arrow accurately matches with index 2, for example, which indicates that an arbitrarily termed large size 2 object may be gripped by the tool.

The movable handle is itself limited to a range of movement extending between closed position in which stop 12 of its sector 23 abuts wall 13 of the rigid handle and the extreme open position in which a pair of stops or shoulders 10 engage against the lower edges 22 of the intermediate portion 2.

In its open position, the movable handle does not mesh with the movable jaw, but while in the process of opening to its extreme open position, the teeth of the handle sector have been in mesh with the teeth of the movable jaw sector and this jaw has, of course been opened to its extreme position by the time the handle has been disengaged from contact with the teeth 8 of said jaw. Due to the clearance space between the teeth 11 of the handle sector 23 and stop 9, it is possible to engage the first or lowest of teeth 11 with the first, second or third teeth, etc., of teeth 8 upon the jaw sector by merely drawing jaw 5 manually upward toward closed position while handle 3 remains wide open. Meanwhile, the arrow on intermediate part 2 will point to the desired initial position engraved or inscribed at 0, 1 or 2 on jaw 5, and when the desired relation is attained as just outlined, it is but necessary to displace handle 3 upward, when it will be found to have its teeth in mesh with the jaw teeth 8 so that it is effective to close said jaw to the intended size of gap with respect to fixed jaw 1.

It is of course obvious that both toothed sectors 23 and 25 have their teeth 11 and 8 arranged concentrically with their respective pivots at 7 and 4, so that the meshing portions are actually engaged gear sectors for all practical purposes, but the teeth are all pointed sharply to avoid flat tops of teeth in one sector directly abutting similar flat tops of the teeth on the other sector, and hence, the teeth will always pass into smooth engagement upon contact.

The gripping surfaces of the opposed jaws are provided in commonly known manner with cross teeth as at 16 and 17, with deep notches as at 15 and 20 adapting the tool for gripping square or hexagonal nuts and bars, etc., the inner faces of said last teeth being preferably convexly curved along generatrices parallel with the axes of pivots 4 and 7. There may be objects which it is desired to grip and hold by means of the tool which cannot readily be accommodated by jaws 1 and 5, and in order to increase the range of utility of the tool in this direction, the pin or bolt 4 has a nut 24 which can be removed so that the bolt may be temporarily withdrawn and another jaw such as 26 of perhaps a series of different jaws may replace jaw 5 when bolt 4 is of course replaced in position and nut 24 returned upon the end thereof. At 30 is indicated in broken lines the outline of jaw 5 in comparison with jaw 26, while the latter may have a concave row of teeth 27 for gripping pipes and other round objects. The toothed sector 29 naturally corresponds with sector 25 of jaw 5 while the teeth 28 are similar to teeth 8 of the same jaw, so that in all respects, jaw 26 or any other in the series will fit, and may replace said jaw 5, in the intermediate member 2.

As already intimated, the handles may both be made of sheet metal, as for example, of iron or steel or various alloys, the section of each handle 3 or 6 being preferably U-shaped by the sheet metal being bent double, while the intermediate portion 2 is more compressed. In the sector portion 23 of handle 6 as well as the jaw portion 1 which is integral with handle 3 and intermediate portion 2, the metal is not only doubled but compressed even more so that a double thickness results, the two portions being in actual contact, and in the case of either or both, the doubled metal may be riveted or welded together or otherwise secured together in any permanent manner known in the art.

The pliers forming the embodiment of the present invention constitute an easily adjusted tool wherein the movable jaw may be readjusted into different relations to the movable handle or replaced by any other of a series of different jaws,

while the movable handle can only be moved to positions which are useful either for adjusting the movable jaw or for actually meshing with its teeth and moving or retaining the same in attained positions, and cannot be displaced into any interfering or troublesome position in which the tool will not operate when moving said handle.

Two further features should now be mentioned, the first being that the jaw 1 has associated with the gripping portion thereof, a projection 18 serving as a cutter, which actually is an extension of the far wall 19 of the intermediate portion, while the movable jaw has a corresponding projection forming a cutter 21 adapted to coact with cutter 18 upon closing the jaws. Naturally, the amount of coaction occurring on the part of the cutters and the gap between them in initial open positions stand in direct ratio to the mutual adjustments of the jaws with respect to their relative spacing or gap in open position.

It has been mentioned that the stop projection 9 of the movable handle 6 which is adjacent to the sector 23 thereof serves to limit the movement of this handle toward the extreme open position, and also to serve as a stop for the movable jaw, but this double purpose need only be served when the movable handle lacks any shoulders or stops similar to 10. When the latter are present, the first use of the stop 9 may be dispensed with and its sole purpose is then to limit the movable jaw in movement and stop the same from closing toward the fixed jaw 1 while the movable handle is in open position. In partly closed positions of this movable handle, the sector thereof is always positively in mesh with the sector of the movable jaw and then directly controls the position of said jaw.

Manifestly, modifications are possible and my invention may be varied to suit different conditions without departing from its genus and scope; such variations may be resorted to, while parts or features may be used without others.

Having now fully described my invention, I claim:

1. Gas pliers or similar tools of the character described, comprising in combination, a gripping jaw integral with one handle of the tool to form a rigid handle and jaw assemblage, a movable gripping jaw pivoted at the root of said first gripping jaw and having a toothed sector concentric with the pivotal mounting of said jaw, a movable handle for operating said movable jaw pivoted to the first handle adjacent to the pivotal mounting of the movable jaw and having a toothed sector concentric with the pivotal mounting of said movable handle, an intermediate portion including a pair of parallel surfaced walls interconnecting the rigid gripping jaw with the first handle, which is integral with said jaw, and having an open slot between the handle and the jaw upon the outer side thereof, said open slot serving as a clearance for the toothed sector of the movable jaw in one extreme position of said sector, means limiting the movements of said movable handle to a range of movement in which the sector thereof meshes with the sector of the movable jaw and one extreme position wherein said movable handle is swung outward from the first handle and the teeth of its sector clear the sector of the movable jaw and allow the latter to be manually shifted into any one of a plurality of different positions in which the sector of the movable handle will engage the teeth of the movable jaw sector upon swinging said movable handle toward closed position, said two spaced walls having two lower edges opposite said slot, and a pair of opposite side shoulders upon the movable handle at the approximate point where the handle proper merges into the sector thereof, which shoulders form simultaneously acting stop abutments adapted to engage against said two lower edges of said spaced walls in order to limit movement of the movable handle and determine the extreme position thereof in the opening direction.

2. Adjustable pliers or similar tools of the character described, comprising in combination, a gripping jaw rigid with one handle of the tool forming together a rigid jaw and handle assemblage, a movable gripping jaw pivoted at the root of said first jaw and having a toothed sector partially rotatable about the pivotal mounting of said movable jaw, a movable handle for moving said movable jaw pivoted to the first handle adjacent to the pivotal mounting of the movable jaw and having a toothed sector partly rotatable with said movable handle about the pivotal mounting thereof, means limiting the movements of said movable handle to a range of movement in which the sector thereof meshes with the sector of the movable jaw and to one extreme position wherein said movable handle is swung outward from the first handle and the teeth of its sector clear the sector of the movable jaw and allow the latter to be shifted at will to any one of a plurality of different positions in which the sector of the movable handle will engage the teeth of the movable jaw sector upon swinging said movable handle toward closed position, and a stop member upon the movable handle adjacent to the sector thereof adapted to engage against the movable jaw in the extreme open position of said movable handle in order to prevent said movable jaw from being turned to closed position with respect to the first or fixed jaw while said movable handle remains in open position.

3. Adjustable pliers according to claim 2, wherein the movable handle is provided with a portion upon the sector thereof projecting into an intermediate channel shaped portion connecting the first handle and first jaw and adapted to abut against the bottom or inside of the said channel shaped intermediate portion and serve as a part of the limiting means for limiting the range of movement of the movable handle, so as to determine a closed position of the movable handle upon the pliers.

4. Adjustable pliers according to claim 1, wherein the movable handle has a stop member adjacent to the sector thereof adapted to engage against the movable jaw in the extreme open position of said movable handle and thereby prevent the movable jaw from being moved into or assuming a closed position with respect to the first or fixed jaw while said movable handle remains in open position.

5. Gas pliers or similar tools of the character described, comprising, in combination, a gripping jaw connected by means of a double wall portion integrally with one handle of the tool to form a rigid handle and jaw assemblage, there being a channel shaped portion forming part of said handle, a movable gripping jaw pivoted at the root of said first gripping jaw in said double wall portion and having a toothed sector rigid therewith by which to move and control the same, a movable handle for operating said movable jaw pivoted to the first handle adjacent to the pivotal mounting of the movable jaw and having a toothed sector adapted in predetermined positions to mesh with

the teeth of the movable jaw sector, a projecting portion rigid upon one side of the sector of said movable handle extending into the channel shaped portion of said first handle and adapted to abut directly against the interior thereof to determine the extreme closed position for said movable handle with respect to said first handle, a pair of lower generally parallel edges upon said double wall portion, and a pair of opposite side shoulders upon the movable handle at the approximate point at which the handle proper merges into the sector thereof serving as simultaneously acting stop abutments adapted to engage against said two lower edges upon said double wall portion in order to limit movement of the movable handle and determine the extreme position thereof in the opening direction.

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