March 27, 1951 L. W. SCHAAFF 2,546,616

TOOL FOR HANDLING OPEN-ENDED SPRING RETAINING RINGS

Filed Sept. 26, 1946

FIG. 1

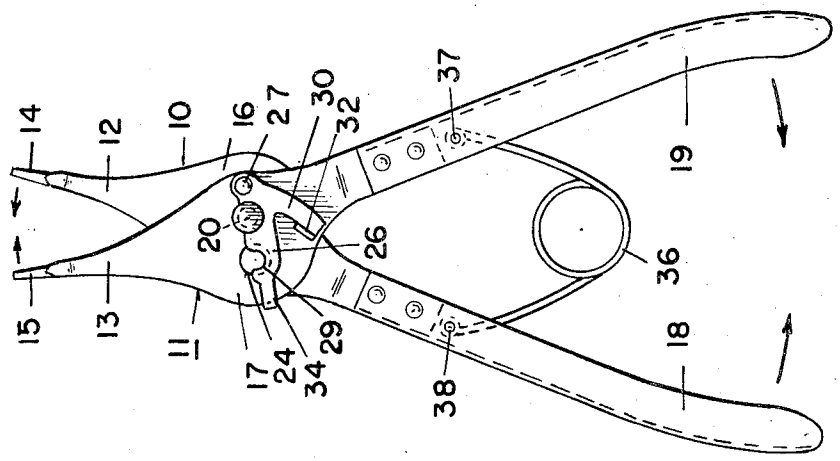


FIG. 2

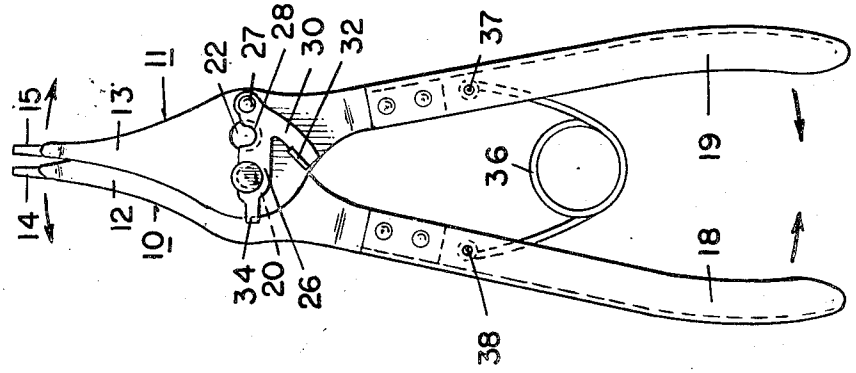
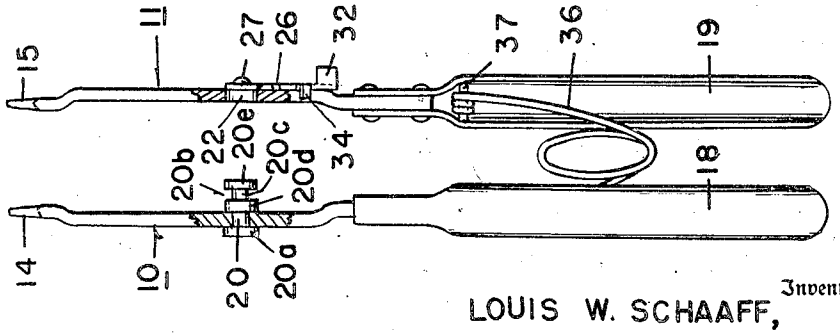


FIG. 3



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TOOL FOR HANDLING OPEN-ENDED SPRING RETAINING RINGS

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2 Claims. (Cl. 29—229)

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This invention relates to improvements in tools for handling open-ended spring retaining rings, and more particularly to improvements in a plier-type tool capable of handling both the so-called internal and external rings as disclosed in application of William Duffy Serial No. 657,211, filed March 26, 1946, now matured into Patent No. 2,483,380, granted Sept. 27, 1949.

As pointed out in that application, the assembly and disassembly of such rings has heretofore required two different types of pliers, one for the internal rings which have to be contracted, and the other for the external rings which must be spread in their assembly and disassembly in and on their housing bores and shafts, respectively. Hence, a mechanic who was called upon to assemble or replace retaining rings in the field was not only required to carry several sizes of pliers for handling the different sizes of rings, but also two complete sets of such pliers, by virtue of the fact that assembly or replacement of both internal and external rings might be necessary.

While a ring handling tool of the type disclosed in the aforesaid Duffy application overcomes this difficulty to a substantial degree, being characterized by a construction which permits the tool to be operated either as a crossed handle or as a simple pivoted-handle type of pliers, the prior convertible tool was open to the disadvantage that the procedure required to convert the tool from one to the other type of operation was a somewhat difficult and complicated one requiring a certain amount of skill and practice.

The present invention, therefore, has as its principal object an improved design of plier type tool which is capable of being operated either as a crossed handle or as a simple pivoted-handle type of pliers, as required for the handling of both the internal and external forms of spring retaining rings, and which is moreover so constructed and designed that conversion from one to the other type of operation may be simply and readily effected.

Another object of the invention is to provide a convertible tool as aforesaid which is of simple, rugged and inexpensive construction and which is characterized by thoroughly dependable operation.

A still further object of the invention is the provision of a plier type tool which is convertible to the handling of both internal and external retaining rings, and which employs a simple and readily operable means for detachably latching the tool parts in the position to which they have been assembled, i. e. either for operation as a

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crossed lever type of pliers or as a simple pivoted-lever type of pliers.

The above and other objects and advantages of the invention will be apparent from the following description, taken with the illustrative physical embodiment thereof shown in the accompanying drawing, in which—

Fig. 1 is a plan view of an improved plier type tool according to the invention assembled to operate as a crossed handle pliers for handling internal retaining rings;

Fig. 2 is a similar view of the tool following its conversion to a pliers of the simple pivoted lever type for handling of external retaining rings; and

Fig. 3 is a side view, partly in section, showing the two main tool parts in an axially separated position.

In the drawings, reference characters 10 and 11 designate the two main tool parts making up a tool according to the present invention, said parts providing tool tips 12, 13 terminating at their free ends in working points 14, 15, and the tips extending from hubs 16, 17 to which handle portions 18, 19 are rigidly affixed. The two tool parts 10 and 11 are adapted in use to be pivotally related through the medium of a pivot pin 20 which is rigidly fixed to the hub portion 16 of the tool part 10 to extend in axial direction from the plane face thereof, the pivot pin being disposed substantially on the hub center and thus lying on the longitudinal center line of the tool part 10. As seen in Fig. 3, the pivot pin 20 is formed with the usual end-securing head 20*a* abutting against the under face of the hub 16, and with an axially protruding head 20*b* abutting against the upper face of said hub. The head 20 is provided with a circular groove 20*c* for the purpose to be described, the groove dividing the head into a bearing section 20*d* of axial depth corresponding to the thickness of the hub 17 and a locking flange section 20*e*.

As seen in Figs. 1 and 2, the hub portion 17 of the other tool part 11 is provided with two spaced pin-receiving apertures 22, 24 which are disposed symmetrically to the sides of the hub center and transversely of the longitudinal axis of the tool part. The spacing of the apertures 22, 24 is such that when the head 20*b* of pin 20 is passed into the righthand aperture 22, the tool parts cross one another at their hub portions 16, 17, it being observed (Fig. 1) that the working point 15 is disposed to the left of working point 14, and is spaced therefrom by a predetermined amount calculated to correspond to the normal spacing between the ear apertures of internal rings of a

size range. Accordingly, when the tool handles 18, 19 are compressed, the working points 14, 15 move towards one another so as to effect contraction of an internal retaining ring into the aperture ears of which the working points 14, 15 are cooperated, the tool meantime operating as a crossed lever type of pliers.

On the other hand, when the head 20b of pivot pin 20 is passed into the hub aperture 24, the hub 17 of tool part 11 is shifted relatively to the right of the corresponding hub element of tool part 10 by an amount such that the tool parts extend substantially parallel (Fig. 2), and their tip portions and working points are transposed relatively to their position when the tool parts cross one another as aforesaid. Thus, the working point 15 lies to the right of the working point 14 by a small distance which is calculated to correspond to the spacing between the ears of external rings falling within a particular range size. Accordingly, compression of the tool handles 18, 19 causes the working points 14, 15 to move away from one another, in the manner of a simple pivoted lever type of tool, so as to effect spreading of an external retaining ring with which the working points are cooperated.

To insure that the working points 14, 15 lie in the same operating plane as required in the handling of plane-form rings, they are offset from their tool tips in the direction towards each other, as seen in Fig. 3.

According to the invention, the diameter of the hub apertures 22, 24 is such that the head 20b of the pivot pin can be freely slipped into and out of either, thereby to facilitate the assembly and disassembly of the tool parts and the conversion of the tool to one or the other type of operation as aforesaid. It will be observed that upon assembly of the tool parts for either type of operation, the tool part 11 can pivot on the axis of pin 20, with the bearing section 20d of the pin head 20b providing a bearing hub therefor.

To secure the tool parts 10 and 11 against axial separation in use, the invention provides latching means which, as shown, comprises a swinging latch arm 26 pivotally secured at one end to hub 17 of tool part 11 by a pin 27. The latch arm is provided in its upper edge with two semi-circular recesses 28, 29 which are spaced by an amount corresponding to the spacing of apertures 22, 24 and the diameter of which corresponds to that of the bottom of a circular groove 20c formed in the head 20b of the pivot 20. The latch arm 26 carries an angularly offset arm 30 provided with a thumb piece 32, the latter facilitating movement of the latch arm 26 to and from its latching position. The free end of the latching arm terminates in a bent-over tang or lug 34 which, through its engagement with the outer edge of the hub 17, is adapted to serve as a limit stop for the latch arm 26.

Thus, when it is desired to assemble and latch together the tool parts in their position shown in Fig. 1, so as to prevent axial separation of the tool parts in use, the latch arm 26 is swung in clockwise direction until engagement of stop lug 34 with the edge of the hub 17 limits further movement. In this position of the latch arm, the semi-circular edge defining the recess 28 thereof moves into the head groove 20c and embraces the bottom thereof, the flange section 20e of the head thereupon engaging against the latch arm and providing a shoulder which prevents unintentional axial separation of the tool parts. Similarly, to lock the tool parts in their position shown in Fig. 2, the latch arm is swung to a position such that the semi-circular edge of the arm recess 29 enters the groove 20c, with head flange 20e providing a shoulder to prevent unintentional separation of the tool parts.

Upon the latch arm 26 being swung in counterclockwise direction to an inactive position, it will be understood that by virtue of the free fit of the head 20b in the apertures 22, 24 the tool parts may be freely moved in separating direction, thus to facilitate lateral shifting of said parts, as required to effect conversion of the tool to operation either as a crossed handle or simple pivoted handle type of tool.

As shown, the tool parts, although readily separable in axial direction, as aforesaid, are coupled together preferably by the spring 36 which maintains the handles in their spread position shown in Figs. 1 and 2, and against the bias of which the handles are compressed in normal operation. Thus, as seen in Fig. 3, the terminal ends of the spring are coiled around cross pins 37, 38 provided within the channeled handles 18, 19 of the tool parts.

Without further analysis, it will be seen that the tool as described achieves the desirable objectives set forth above of providing a plier-type tool that is convertible to the handling of both the so-called internal and external retaining rings, which is characterized by simple and rugged construction and which is so designed as to facilitate and simplify the procedure of shifting the tool fulcrum point as required in the conversion of the tool to and from either type of operation.

As many changes could be made in carrying out the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A shiftable pivot connection for pivotally connecting a pair of elongated members having terminals at one end thereof which are offset towards one another to lie in a common plane in two relative positions in which the terminal ends of said members are transposed with respect to each other, comprising a pivot pin having a cylindrical head carried by one of said members intermediate its ends and being disposed substantially on the longitudinal center line of said member, the other member being provided with two full-circular apertures having diameter corresponding to that of the head of the pivot pin whereby said members can be assembled one with the other by inserting the head in either aperture and said members are also freely separable, said apertures being spaced laterally from one another and symmetrically with respect to the longitudinal center line of said other member by an amount such that when the head is inserted in one aperture the members extend substantially parallel and when inserted in the other aperture the members cross one another and their offset terminal ends are relatively transposed, and latching means carried by said other member and coacting with said head for securing said members together in either one of their two relative positions aforesaid.

2. A shiftable pivot connection as set forth in claim 1, wherein the cylindrical head of the pivot pin is provided with a groove spaced from the surface of said one member from which it protrudes an amount corresponding to the thickness

of the other member, and said latching means comprises an arm having substantially semicircular notches in an edge thereof which are spaced a distance corresponding to the spacing of said apertures and being mounted upon assembly of said members to swing from a retracted to a latching position in which the semicircular edge of the notch which registers with the head seats in the groove thereof.

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