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ATTORNEY.
This invention relates to a tool for applying a cotter pin or key by bending the ends thereof to obviate accidental displacement from a pin or shaft to which applied. This application is an improvement of the tool described in my pending application, Serial No. 542,379, filed October 24, 1955, and now Patent No. 2,821,100.

A usual form of cotter key or pin comprises a folded length of half-round wire with an eye at the fold. The pin is retained against accidental retraction, after being inserted in the hole of a member to which applied, by bending the free end of the wire. Usually, said ends are bent in opposite directions. It is an object of the present invention to provide a simple and improved tool for effecting such bending with easy facility.

In many fields, particularly aircraft construction, there are a multiplicity of places where cotter pins are used to retain pins, shafts or other elements against displacement. Our application in which many cotter-keyed pins are used, is adjacent to the peripheries of grooved pulleys to retain control cables against accidental dislodgement from the grooves. It will be evident that access for placing the cotter pins and bending the ends thereof is frequently difficult. Another object of the invention is to provide a tool of the character referred to that may be of elongated form to reach difficult-of-access places and may, if desired, have a degree of flexibility that facilitates its use.

The invention is also characterized by simplicity, it being an object of the invention to provide a plier-like tool that has cotter key-engaging and -bending ends that may be readily closed over such a key to first spread the ends thereof and, by a follow-up movement of the tool handles, to so bend said ends that the same are doubled back on either side of the pin or shaft to which the key is applied.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a side elevational view of a tool for bending the ends of a cotter key, the same embodying a preferred form of the invention.

Fig. 2 is an enlarged side elevational view of the operating portion of the tool and shown in an intermediate operative position.

Fig. 3 is a cross-sectional view as taken on line 3—3 of Fig. 2.

Fig. 4 is a longitudinal sectional view, partly in elevation, of said operative portion of the tool and shown in final operative position.

Fig. 5 is a cross-sectional view on the plane of the line 5—5 of Fig. 4.

The tool that is illustrated is adapted to apply a cotter pin 5 into a hole in a pin or shaft 6, said cotter pin, in the usual manner, being provided with an eye 7 and with ends 8 that may be bent from a straight position to the position of Fig. 5. When so bent, the ends prevent endwise retraction of pin or shaft 6.

The present tool comprises, generally, conventional pliers or pincers handles 10 and 11 connected by a pivot 12 and respectively provided with arms 13 and 14 on the opposite side of said pivot from the handles 10 and 11, a shaft- and cotter pin-holding portion 15 on the free end of the arm 13, an end-spreader 16, an end-bending portion 17 provided on the free end of the arm 14 and mounting said spreader 16, and a spring 18 biasing said end-spreader to a normally projected position.

The handles 10 and 11 are resiliently held in spread condition by a spring 19, thereby biasing the arms 13 and 14 to a normally spread position from which hand-closing manipulation of the handles effects movement of said arm to the operating positions, first of Fig. 2, and then of Fig. 5.

The portion 15 is formed to have transversely spaced walls 20 that, between them, define a longitudinal top-open seat 21 for the shaft 6. The bottom of said seat, intermediate its ends, is further recessed to provide a pocket 22 in which may be accommodated the eye 7 of the cotter key carried by such shaft. Said seat may have a resilient engagement with such eye 7 to insure retention of position of the tool in operation.

The end-spreader 16 is formed as a block 23 of generally rectangular cross-sectional form; one end of said block may be provided with abutment flanges 24 and the opposite end is wedge-shaped, as at 25, and in longitudinal co-alignment with the seat 21. Said wedge 25, therefore, is adapted to enter the upper open end of seat 21 when moved toward said seat.

The end-bending portion 17 comprises an integral part of arm 14, the same being comprised of transversely spaced extensions 26 of said arm, and an end connecting wall 27. It will be seen that the end face 28 of arm 14, the extensions 26, and the end wall 27, cooperate to define a rectangular opening in which the end-spreader 16 is slidingly or loosely telescopically fitted. Normally, the flanges 24 of said spreader 16 limit the projected position of the opposite wedge end thereof, relative to the arm 14, the spring resiliently retaining such projected position. In practice, said spring is made to be sufficiently strong to resist retraction of the spreader while spreading the cotter ends 8, as in Fig. 3, but sufficiently resilient to allow retraction of the spreader during continued closing movement of the arms 13 and 14.

It will be realized, of course, that either of the arms 13 or 14 may be above the other, or the same may be applied sidewise, it being immaterial to the operation of the tool how the same is applied, provided that a shaft 6 is fed into its way into seat 21 and the eye 7 of a cotter key, passed through the hole in said shaft, enters pocket 22.

Upon the first movement of arm 14 toward arm 13, the wedge end 25 of spreader 16 encounters the V-notch normally defined between the ends of ends 8. It will be noted that the pocket 22 so holds the cotter key from rotating that such engagement of spreader and key ends is automatic.

As the closing movement of arms 13 and 14 is continued, the spreader 16, while spring 18 projects the same, as limited by shoulders 24, spreads ends 8 to the position of Fig. 3. Then, as said closing movement is continued,
the movement of the spreader is arrested by the shaft 6 and the extensions 26 impart a full 180° bend to the ends 8 while arm 14 moves toward arm 13, as in Figs. 4 and 5. In order that full movement of the arms may be effected, the arm 14 and wall 27 are provided with recesses 29 to provide clearance for shaft 6, as best seen in Fig. 4.

After the above-described end-bending operation, upon release of pressure on handles 10 and 11, the arms 13 and 14 will spread to enable extrication of the tool from the cotter key-provided shaft 6.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A tool for bending the ends of a cotter key, said tool comprising an arm having a shaft-receiving seat, transversely spaced side walls projecting upwardly at each side of said seat, there being a pocket in said seat to receive the eye of a cotter key, a second arm having an opening in its end, a spring-urged spreader disposed in said opening and provided with a wedge portion adapted to spread the ends of a cotter key connected to a pin in said seat, said arms being hinged connected and provided with handles to pivotally move them in a direction to bring the spreader in key-end spacing position, and said second arm being provided with extensions to engage the spread key ends and to bend them to a position downwardly against the side walls and alongside said shaft-receiving seat in the first arm upon continued movement of the arms toward each other.

2. A tool for bending the ends of a cotter key, said tool comprising two relatively pivotally movable arms, a shaft and cotter key-receiving and supporting part on the end of one of said arms, spaced side walls at each side of said supporting part, said side walls extending upwardly above said supporting part, a resiliently mounted key end-spread- ing member telescopically carried by the other arm and provided with a wedge to effect such spreading and to engage the shaft to arrest the movement of the spreading member during continued pivotal movement toward each other of said arms, and key end-bending members being positioned laterally of said side wall and movable into the plane of said side walls during pivotal movement of the arms, to bend the cotter key ends that are spread by the spreader into doubled-back relation to a shaft and against the outer faces of said spaced side walls.

3. The structure of claim 2 characterized in that the spreading member is formed with shoulders at its outer end to limit its telescopic movement in one direction, the key-end bending member having a key-end engaging edge spaced from said shoulder when the spreading member is in the position to which it is limited by said shoulder, a distance corresponding to the length of the wedge to complete key-end spreading action prior to key-end bending.

4. The structure of claim 3 characterized in that a flat spring member is carried by the assembly for holding the spreading member normally projected to the extent permitted by the shoulders.

5. The structure of claim 2 characterized in that the key-end spreader member-carrying arm is provided with recesses for receiving shaft portions when the arms are moved to closed position.

References Cited in the file of this patent

FOREIGN PATENTS

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