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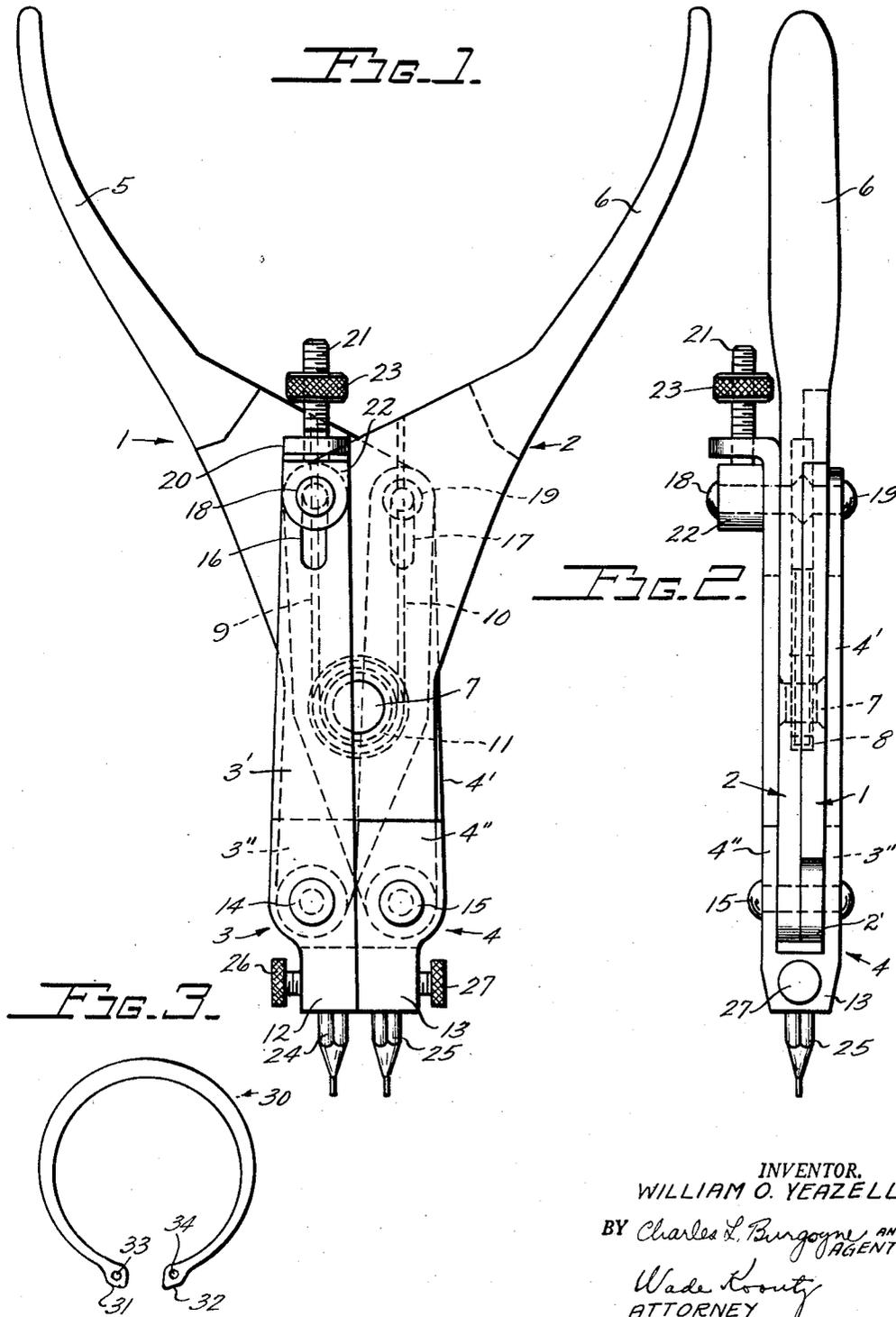
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PARALLEL EXPANDING-JAW PLIERS

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PARALLEL EXPANDING-JAW PLIERS

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1 Claim. (Cl. 81—5.1)

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The invention described herein may be manufactured by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to special pliers of the parallel-jaw type, and more particularly to pliers having jaws which open as the plier handles are moved toward each other.

The primary object of the present invention is to provide a set of pliers equipped with parallel jaws which expand or open at the same time that a pair of handle members of the pliers are closed toward each other by the gripping action of an operator's hand.

A further object of the invention is to provide a set of pliers of the parallel-jaw type in which each of the jaw members is provided with means to detachably secure thereto specially shaped elements adapted to grip the work piece, which work piece may then be manipulated by means of the pliers.

Another object of the invention is to generally improve on and extend the field of usefulness of pliers of the parallel-jaw type.

It is also within the scope of objects of the invention to provide an improved pliers capable of holding and manipulating spring fasteners of the split ring type.

The above and other objects of the invention will become apparent upon reading the following detailed description in conjunction with the accompanying drawings, in which:

Fig. 1 is plan view of the improved pliers with the parallel jaws in closed relation.

Fig. 2 is a side view of the improved pliers.

Fig. 3 is a plan view of a split ring fastener particularly adapted for manipulation by means of the improved pliers.

Fig. 4 is a perspective view of the improved pliers with the parallel jaws in open relation.

Fig. 5 is a vertical cross section taken on line 5—5 of Fig. 4.

Referring to Figs. 1 and 2 it will be seen that the pliers of the present invention comprise four main parts, namely the handle members 1 and 2 and the jaw members 3 and 4. The handle members include the widened grip elements 5 and 6 at the upper end portions thereof and therebelow the handle members consist of flat plate-like portions in face-to-face relation and rotatably connected by a pivot 7 having countersunk head portions. Between the confronting faces of the handle members there is provided a spring recess 8 which forms an annular space around pivot 7, and the confronting faces are also provided

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with grooves 9 and 10 to receive the free ends of a torsion coil spring 11. The coil spring is so tensioned that the free ends thereof tend at all times to hold the handle grip elements 5 and 6 as far apart as possible and also tend to hold the lower ends of the handle members as close together as possible.

Each of the jaw members 3 and 4 includes spaced apart portions which fit around the plate-like handle portions in closely embracing relation as shown particularly in Fig. 2. Thus it will be seen that the jaw member 4 includes a relatively long upwardly extending portion 4' spaced from and parallel to the shorter upwardly extending portion 4''. The spaced portions 4' and 4'' are connected together at their lower ends by a jaw chuck portion 13 adapted to close tightly against a similar jaw chuck portion 12 formed at the lower end of the other jaw member 3. The portion 12 of jaw member 3 serves to join together the spaced portions 3' and 3'' of the jaw member. In assembling the jaw members 3 and 4 over the pivotally connected handle members it is necessary to position the longer jaw portions 3' and 4' on opposite sides of the handle assembly, so that they may be connected to the proper handle members in a manner to be explained below. Thus it will be seen that the longer portion 3' of member 3 is adjacent to the shorter portion 4'' of member 4, while the longer portion 4' of member 4 is adjacent to the shorter portion 3'' of member 3.

The jaw members 3 and 4 are connected to the handle members in a parallel articulated fashion by means of the two lower pivots 14 and 15 which extend through the spaced portions of the jaw members and through the lower ends of the handle members as shown. The pivot 14 serves to connect the lower end of handle member 1 with the lower end of jaw member 3, while the pivot 15 serves to connect the lower end of handle member 2 with the lower end of jaw member 4. The lower ends of the handle members 1 and 2 include circular bosses 1' and 2' which help to fill out the spaces between the spaced portions of the jaw members and prevent looseness or lateral play between the parts working on the pivots 14 and 15. At the upper ends of the longer jaw portions 3' and 4' there are provided slots 16 and 17 forming slide guides for the articulating pivots 18 and 19 which extend through the slotted jaw portions 3' and 4' respectively and through the plate-like portions of the handle members 2 and 1 respectively. Thus the upper end of the jaw member 3 is slidably guided

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by a pivot secured to handle member 2, while the upper end of the jaw member 4 is slidably guided by a pivot secured to handle member 1. This guiding function of the slots and pivots serves to hold the jaw members in parallel relation at all times within the relatively narrow range of movement afforded by the length of slots 16 and 17.

The present parallel expanding jaw pliers is characterized by the fact that the jaw members 3 and 4 are moved away from each other by movement of the grip elements or members 5 and 6 toward each other. This makes one-hand control of the pliers possible by exerting a steady squeezing action on the grip elements until the proper jaw opening has been achieved. This action is made possible by constructing the pliers with the pivot 7 on the longitudinal center line of the pliers and by locating the jaw members 3 and 4 on the same sides of the center line or mid-line as the grip elements 5 and 6 respectively of the handle members 1 and 2.

While the slots 16 and 17 and the pivots 18 and 19 will limit the extent of relative movement of the handle members and articulated jaw members, the present plier construction further includes the provision of adjustable stop means to limit the extent of movement of the handle members toward each other and the jaw members away from each other. This stop means includes an angularly extending lug 20 forming an extension at the upper end of the jaw portion 3', with the lug apertured to slidably receive a threaded stud 21 integrally connected to a collar 22 mounted on the guide pivot 18. The threaded stud 21 carries an adjustable stop nut 23 which may be set at various distances from the lug 20 to provide a definite stopping point as the handle grip portions 5 and 6 are brought together. The stop means will avoid unnecessary stressing of the spring fastener devices which are to be manipulated by the present tool.

From the description as stated hereinabove it may be seen that the handle members 1 and 2 are adapted for relative rotation about the main pivot 7, and as they are so rotated from the position as shown in Fig. 1 to bring the handle grip elements 5 and 6 toward each other the relative movement will cause the jaw pivots 14 and 15 and the jaw members 3 and 4 to move away from each other. As this action occurs the jaw pivots 14 and 15 will move closer to the guide pivots 18 and 19 respectively, and the slotted upper ends of the jaw members will slide relatively to the guide pivots. This articulation of the jaw members will thus assure a constantly parallel relation therebetween as the members move toward or away from each other. After the jaw members have been opened up the relative positions of the various elements will appear as shown in Fig. 4.

Each of the jaw chucks 12 and 13 is provided with a non-circular opening adapted to receive one of the fastener manipulating pins 24 or 25, which are held in place within the jaw chucks by means of set screws 26 and 27. The free ends of the pins 24 and 25 may have any appropriate shape or configuration for convenient application to various spring fasteners or other members to be manipulated, but as shown in the present drawing the pins are merely provided with slender extensions of a diameter calculated to fit loosely within openings provided in the spring fastener shown in Fig. 3 of the drawing. If desired the free ends of the pins 24 and 25 may have angular extensions so that the pliers may

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be held in a more convenient position as they are manipulated. The particular configuration or shape of the pins 24 and 25 may be varied according to the use to which the pliers are to be put, and there may be provided a variety of pairs of pins adapted for detachable connection within the jaw chucks 12 and 13.

The preferred use of the present plier construction is in the manipulation of a split ring fastener of the type shown in Fig. 3, which is adapted for application around the outside of a shaft or rod member having formed therein an annular recess to receive the ring. The operation of applying these split ring fasteners is very much speeded up if some means is provided for opening the ring to the desired extent and holding it open while the same is applied over the shaft having the annular recess adapted to receive the ring. In Fig. 3 the ring itself is designated by the numeral 30 and the spaced ends thereof are provided with lugs or enlargements 31 and 32 which are respectively apertured at 33 and 34 to receive the free end portions of the jaw carried pins 24 and 25. The distance between the end portions of the pins 24 and 25 should be such that they may be inserted in the apertured lugs of the ring 30 without springing the ring 30 open to any extent, although it may be necessary to open the jaw portions of the pliers slightly before inserting the pins in the ring apertures 33 and 34. Having mounted the ring on the pin members 24 and 25 the mechanic may then grip the handle members in such a manner as to spread the jaws 12 and 13 apart at the same time opening up the split ring 30 for the application thereof over the end of the shaft or other member adapted to receive the ring. Because the ring in its open condition will be under considerable tension it will consequently remain mounted on the pin members 24 and 25 due to the friction between the ring and pin members. After the ring is mounted over the shaft and brought to the desired position the handle members of the pliers may be released thus allowing the jaws to close together under the action of the coil spring 11. Ring 30 being in place the pliers may then be removed until such time as it is desired to remove the ring 30 or apply additional rings.

The embodiments of the invention herein shown and described are to be regarded as illustrative only and it is to be understood that the invention is susceptible to variations, modifications and changes within the scope of the appended claim.

I claim:

Parallel expanding jaw pliers comprising, a first handle member having a handle grip portion at one end, a second handle member having a handle grip portion at one end, a pivotal connection between the first and second handle members located intermediate of the ends thereof and providing a pivotal axis intersected by a mid-line passing between said handle grip portions and equidistant from said portions at all points thereon, a first jaw member, a second jaw member, a pivotal connection between the first handle member and the first jaw member and spaced from said mid-line in the same direction as the first handle grip portion, a pivotal connection between the second handle member and the second jaw member and spaced from said mid-line in the same direction as the second handle grip portion, a pin on the first handle member movable in a slot provided in the second jaw

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member with the pin and slot spaced from said mid-line in the same direction as the second handle grip portion, a pin on the second handle member movable in a slot provided in the first jaw member with the pin and slot spaced from said mid-line in the same direction as the first handle grip portion, an apertured lug on one jaw member at one end adjacent to the slot therein, a threaded stud pivotally mounted on the pin movable in the last mentioned slot with said stud extending through the aperture of said lug, and a stop nut adjustably mounted on the free end of said threaded stud to contact said lug and thus provide a stop action for the movement of said jaw members away from each other and for movement of said handle grip portions toward each other.

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