Dec. 28, 1954 I. HERMAN ET AL 2,697,871

SPRING RING ASSEMBLING TOOL

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Fig. 1.

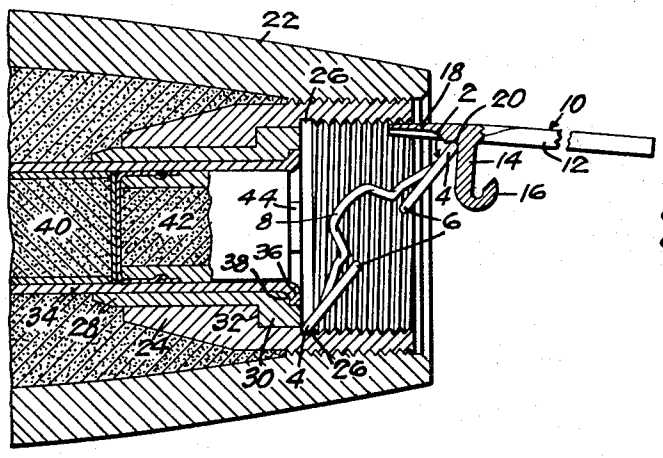


Fig. 2.

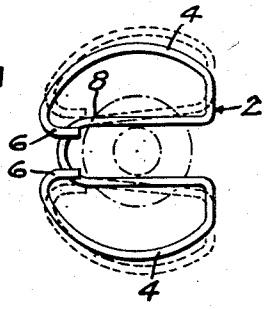


Fig. 3.

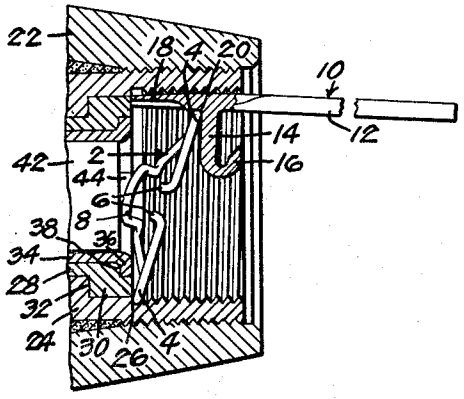


Fig. 4.

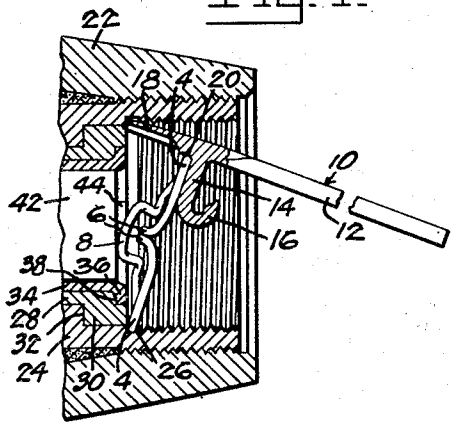
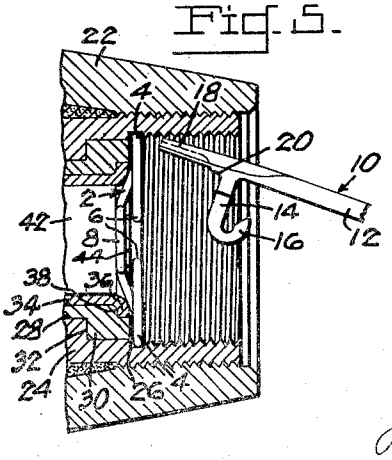


Fig. 5.



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Fig. 6.

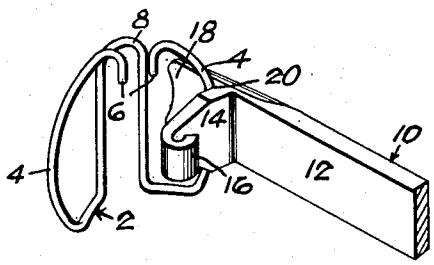


Fig. 9.

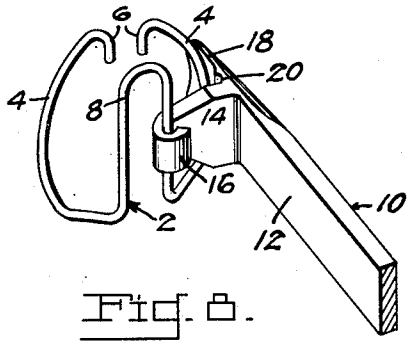


Fig. 7.

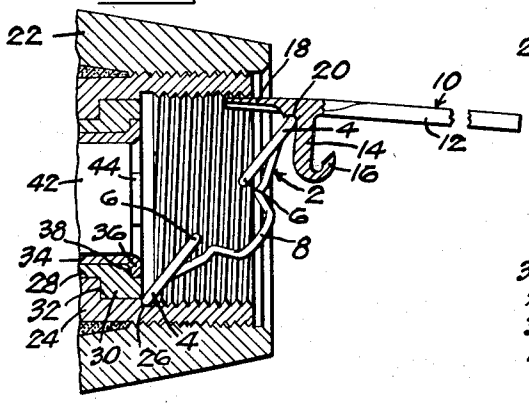


Fig. 8.

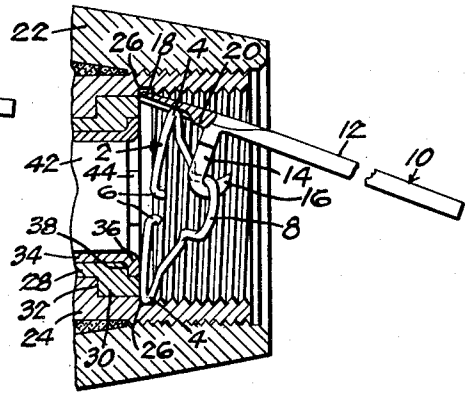


Fig. 11.

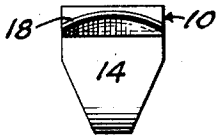


Fig. 10.

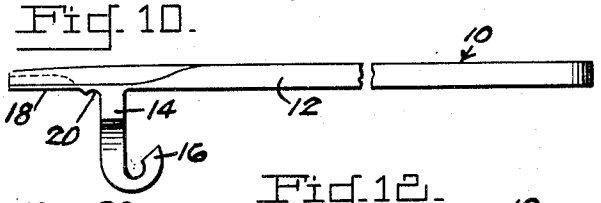
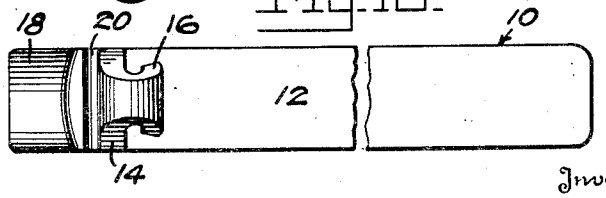


Fig. 12.



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SPRING RING ASSEMBLING TOOL

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Application August 7, 1950, Serial No. 178,161

2 Claims. (Cl. 29—229)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to improvements in hand tools and has for its primary object to provide a simple and efficient hand tool for inserting spring retaining clips or rings into recesses for retaining assemblies together.

Another object of our invention is to provide a hand tool which will not only quickly and easily insert spring rings into recesses but will also automatically remove the said spring ring if it be improperly inserted into the recess.

An additional object of our invention is to provide a novel method of inserting retaining spring rings into casings or sockets which is simple, efficient, and offers the further advantage of automatically preventing improper assembly.

With the foregoing general objects in view the invention consists of a bar like member which may be so formed, stamped, distorted or bent as to form a tool at little expense and that will provide considerable operating efficiency for its intended purpose.

Fig. 1 is an elevation of the invention applied in the initial position.

Fig. 2 is a plan view of the spring ring used in our invention.

Fig. 3 is an elevation of the invention showing the second step in the assembly.

Fig. 4 is an elevation of the invention showing the third step in the assembly process.

Fig. 5 is an elevation showing the final step in the assembly process.

Fig. 6 is a perspective view of the invention with the spring ring in its correct position for assembly.

Fig. 7 is an elevation of our invention with the spring ring in an incorrect position for assembly.

Fig. 8 is an elevation of our invention with the spring ring in an incorrect position for assembly.

Fig. 9 is a perspective view showing the tool engaging the incorrectly inserted spring ring.

Fig. 10 is an elevation of the tool used in our invention.

Fig. 11 is an end view of the tool of Fig. 10.

Fig. 12 is a plan view of the tool of Fig. 10.

The spring ring, best shown in Fig. 2, is constructed of a single piece of wire **2** and is of roughly circular form having two outer coils or loops **4**, the free terminals of said loops being bent inwardly to form hooks **6** and the ends of said loops being bent inwardly and outwardly upon themselves to form a reentrant portion or U, shown generally as **8**. As best shown in Fig. 6, the plane of the reentrant portion or U, **8**, is disposed at an angle with the plane of the loops, **4**, for purposes of spring action against a portion of the assembly as will appear below.

The tool for cooperation with the spring ring is shown generally at **10** and comprises a shank **12**, a prong **14**, having a hook **16** on the end thereof, fastened to or formed integral with the shank and an arcuate tongue **18**, formed as an integral extension of the said shank. A notch or groove **20**, best seen in Figs. 10 and 12 is cut on the tongue side of the prong at right angles to the longitudinal axis of the shank and operates as a detent or catch when the spring ring is engaged therewith.

The problem solved by applicant involves the assembly of the component parts of a shell but it is to be understood that the means and method are applicable to any

assembly or subassembly whatsoever and are not limited to ordnance structure.

Referring to Fig. 1, **22** indicates a shell body having threads machined into the mouth thereof, **24** is an adapter exteriorly and interiorly threaded for cooperation with the shell body mouth. The said adapter has cut therein an annular groove **26** of smaller diameter than the unstressed diameter of the spring ring but of greater diameter than the interiorly threaded portion. **28** is a burster casing sleeve which has an integral annular shoulder **30** and slides within the adapter **24** until the said shoulder engages flange **32** of the said adapter. Burster casing **34** has an integral annular flange **36** for cooperation with shoulder **38** of the said burster casing sleeve **28**. Burster charge **40** slides within burster casing **34** and abuts burster initiator **42**. When the organization is finally assembled, as will appear below, the burster initiator **42** and in turn the burster charge **40** are urged to the left by the spring action of the U-shaped portion **8** of the spring ring which straddles boss **44**. It will be readily seen that the burster casing sleeve **28**, the burster casing **34**, the burster initiator **42** and the burster charge **40** are all retained in position by the spring ring and it is important that the said spring ring be accurately seated with a minimum of errors in assembly and displacement thereafter.

Heretofore it has been the usual practice to insert these spring rings by hand or with the aid of such conventional tools as screwdrivers. Such an operation is difficult and tiresome to the operator and applicants' contribution to the art has introduced a method of assembly that makes the insertion of spring rings a simple and efficient operation.

When the various described parts are in the assembled position shown in Fig. 1 the spring ring is positioned with one loop **4** thereof within annular groove **26** and the plane of the said ring disposed at an acute angle to the longitudinal axis of the shell. The other loop is seated within groove **20** in tool **10** and the plane of the U-shaped portion **8** is between the burster initiator **42** and the plane of the loops **4**.

The tool holding the ring is urged toward the bottom of the shell mouth until it seats on burster casing sleeve **28** as shown in Fig. 3. In this position the ring is rotating toward its final position at right angles to the longitudinal axis of the shell and one leg of the U, **8**, has seated on one side of boss **44**.

With annular groove **26** as a fulcrum as shown in Fig. 4, tool **10** is used as a lever of the second class and is rotated clockwise from its inserted position thereby urging the two loops **4** of the spring ring together generally as shown in the solid lines of Fig. 2.

The rotation of the tool is continued until the loop cams out of notch **20**. The rings inherent resilience forces the free loop to slide down arcuate tongue **18** as the ring expands, and when the tool is removed from the groove **26** (Fig. 5) the ring snaps into place with the U-shaped portion **8** straddling boss **44** and all slidable parts of the shell firmly secured together. The tool is removed from the shell mouth and the shell is ready for the next operation.

Figs. 7, 8 and 9 show the interaction of the parts when, through accident or mistake, the snap ring be inserted turned through 180 degrees from the position shown in Fig. 1. In this position, if assembly be completed, the resilience of the U-shaped portion **8** cannot be imparted to the burster igniter, resulting in a loose and improper structure.

As shown in Fig. 7 the spring ring is positioned with one loop **4** thereof within annular groove **26** and the outside of the other loop **4** engaged with groove **20** in tool **10**.

When the tool is rotated as a lever as previously described the two loops **4** again are urged toward each other but now hook **16** at the end of prong **14** takes a position between the two legs of the U. As the rotation is continued the loop cams out of the groove **20** and slides down the arcuate tongue **18** toward its seated position in annular groove **26**. However, its motion is arrested by the engagement of the hook **16** with one of the legs of the U as shown in Figs. 8 and 9. The resilience of the spring ring in expanding to its normal size produces

such a degree of intimate engagement that it is now impossible to remove the tool from the shell without removing the spring ring therewith.

Applicant, as pointed out above, has provided an extremely simple means and method whereby a high degree of efficiency is obtained in the art of retaining assemblies together by spring rings. Applicants' invention has further provided a novel and fully automatic guard against operators' errors through the use of which the assembly costs of shells has been greatly reduced.

Various modifications may be made in this invention without departing from the spirit thereof or the scope of the claims, and therefore the exact forms shown are to be taken as illustrative only in a limiting sense and it is desired that only such limitations shall be placed thereon as are set forth in the accompanying claims.

We claim:

1. A hand tool for forcing spring rings into sockets comprising a flat shank, an arcuate tongue formed on the end of said shank, a hook radiating outward from the said shank on the concave side of the said arcuate tongue and having the open end thereof facing away from the said tongue to engage a portion of the said ring upon improper insertion thereof, and a ring engaging groove formed in said shank between the said hook and the said arcuate tongue.

2. A hand tool for forcing spring rings into sockets comprising a flat shank portion fairing into an arcuate tongue portion at one end thereof, a groove formed in the said shank portion on the concave side of the said tongue portion and a hook disposed adjacent the said groove and at right angles to the said shank and having the open end thereof facing away from the said arcuate tongue portion to engage the said spring ring upon improper insertion thereof, the said groove disposed between the said hook and the said tongue portion.

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