

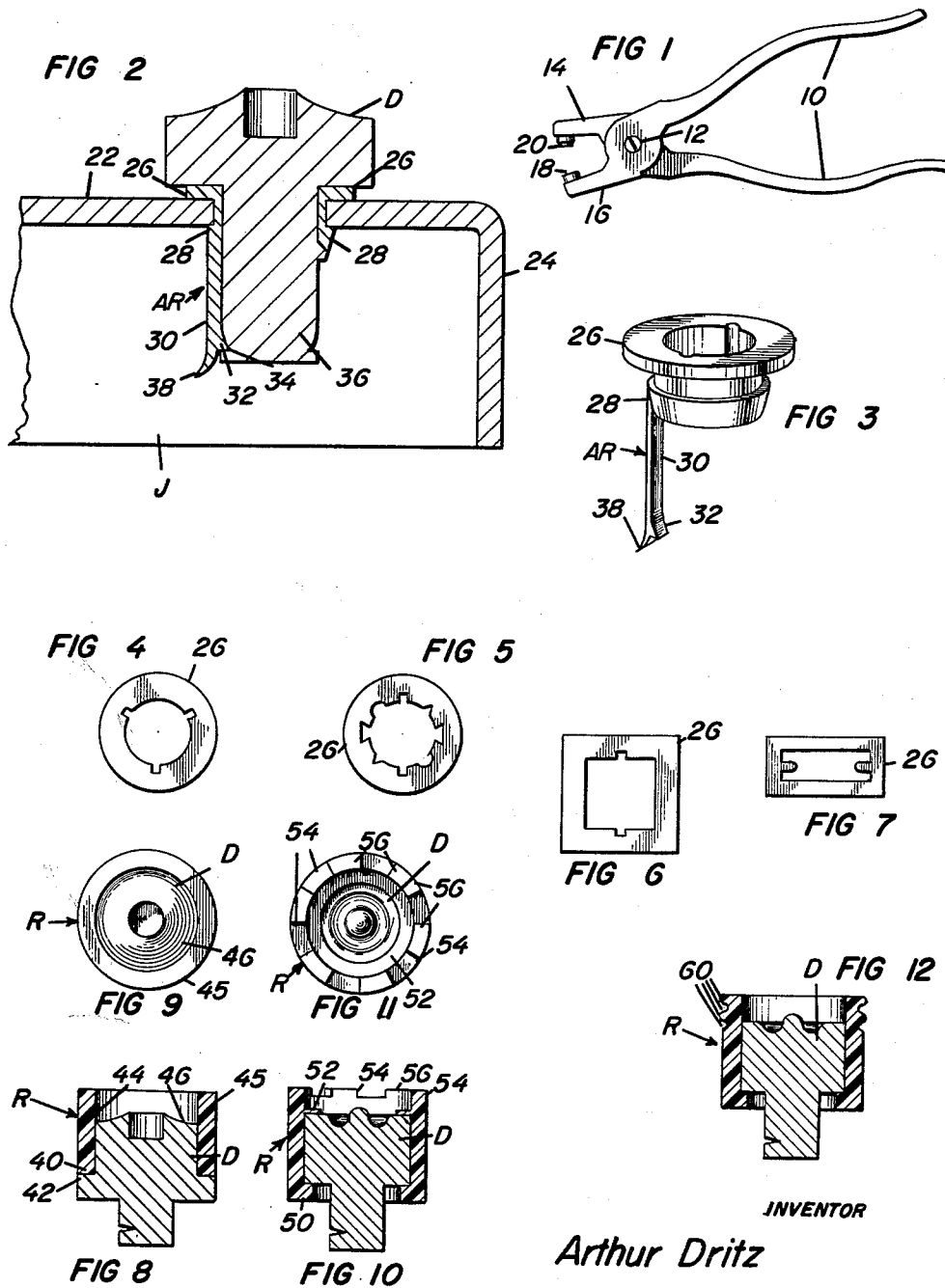
March 2, 1965

A. DRITZ
PLIER DEVICE

3,171,132

Filed July 16, 1962

4 Sheets-Sheet 1



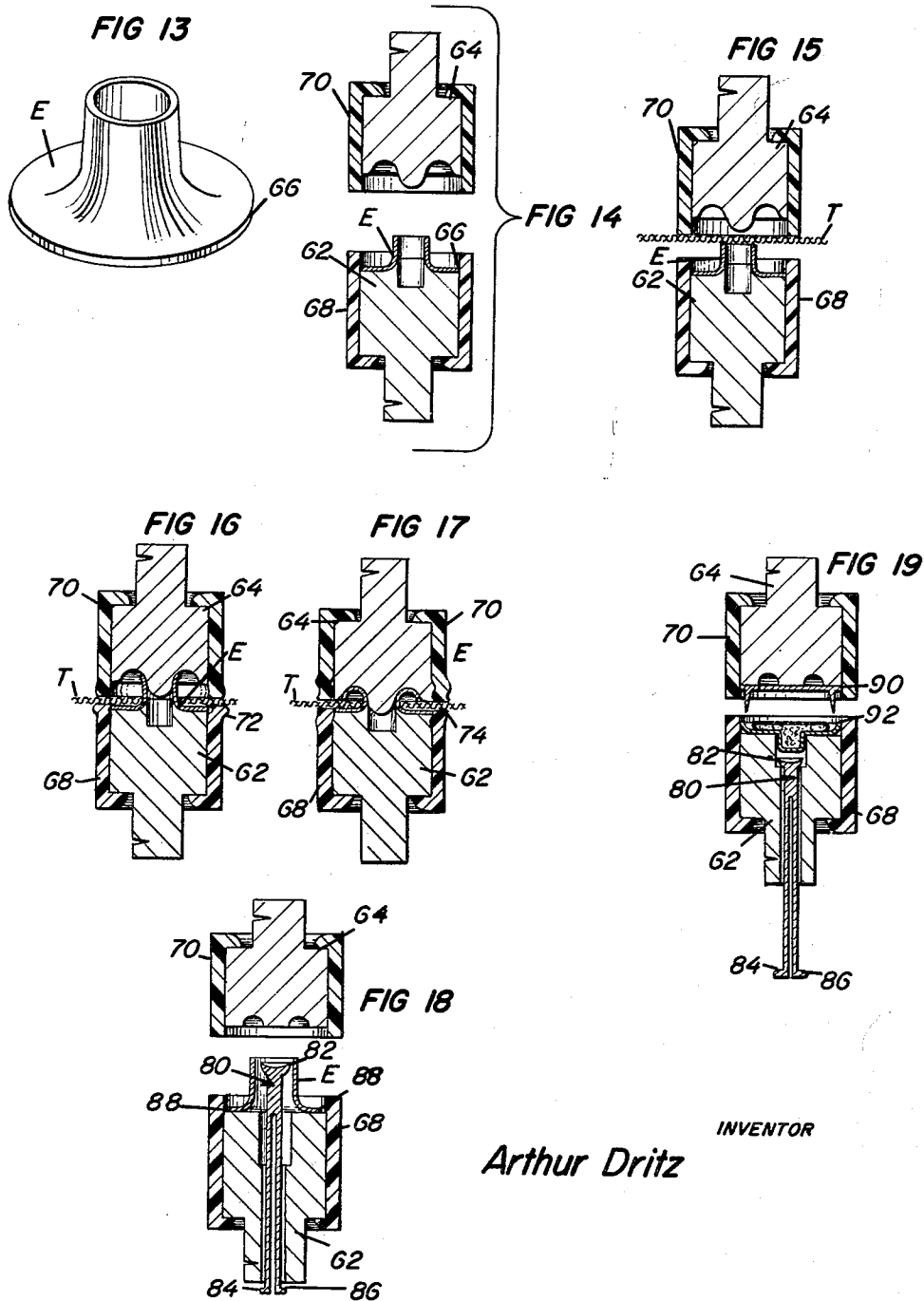
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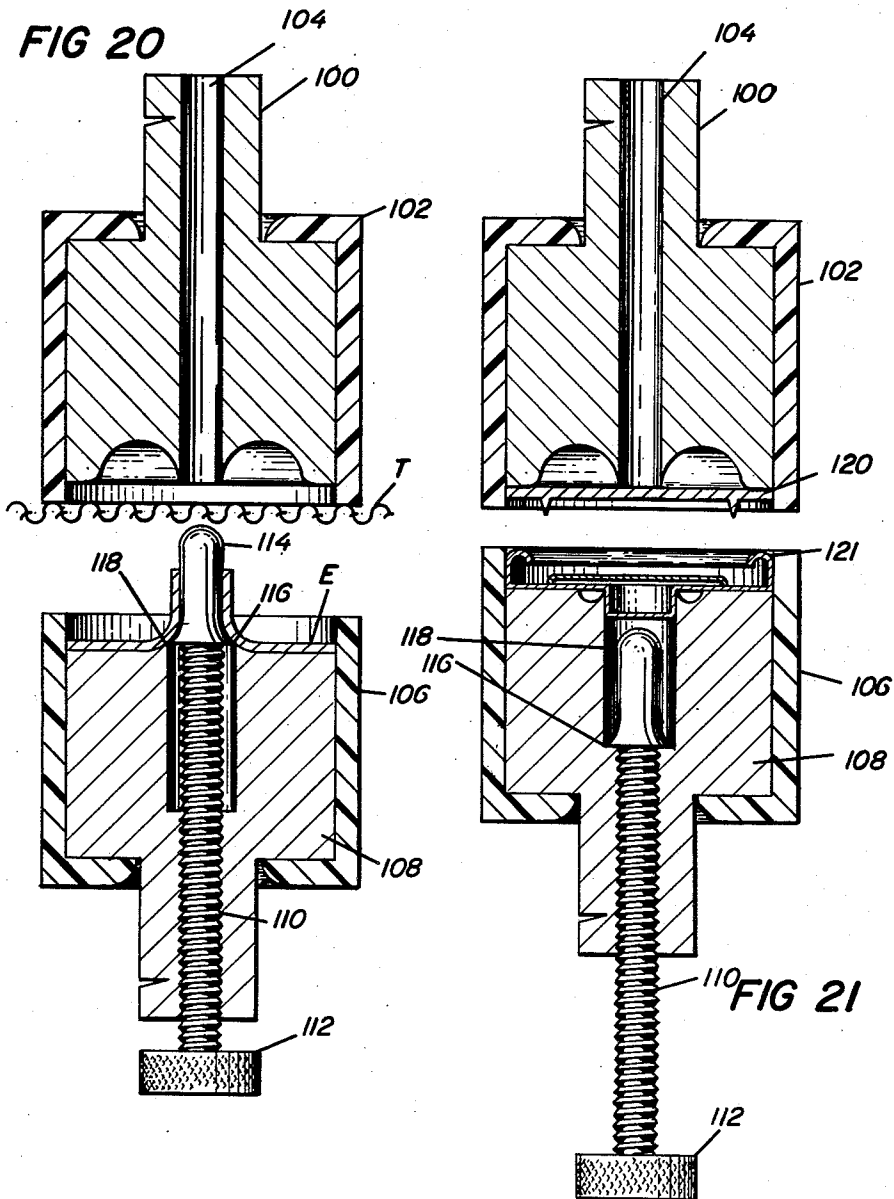
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INVENTOR

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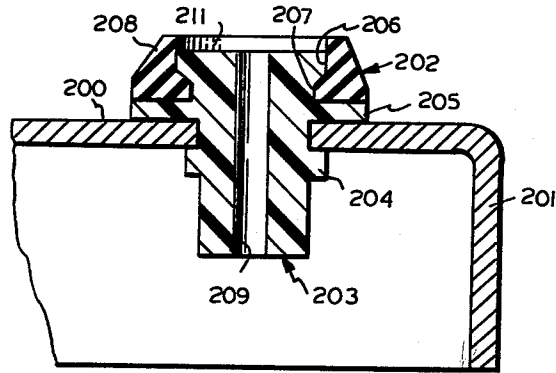


FIG. 22

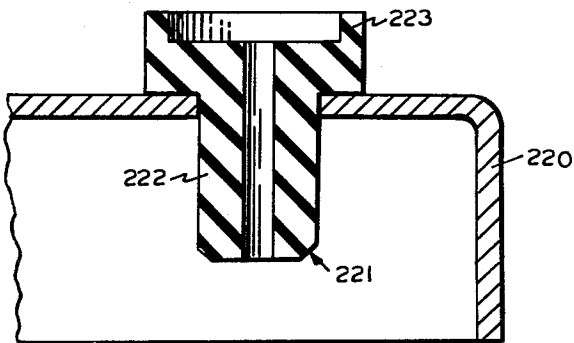


FIG. 23

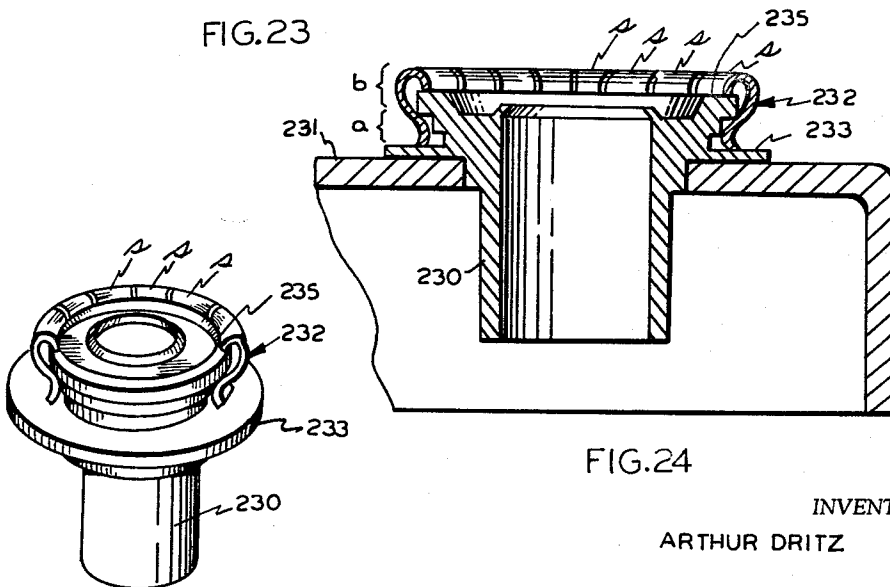


FIG. 24

FIG. 25

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16 Claims. (Cl. 1—317)

This is a continuation-in-part of application Serial No. 110,295, filed May 5, 1961, now abandoned.

This invention generally relates to improved mechanical aids for applying relatively small metallic objects to sheets of material. More specifically, this invention pertains to a plier-like tool and associated mechanical aids for facilitating the application of relatively small metallic objects such as eyelets, prong rings, studs, sockets, etc., to sheets or pieces of textile, plastic or paper material.

It is, therefore, a primary object of this invention to provide a plier-like tool useful for forming, shaping and interfitting relatively small metallic pieces and, which is substantially free of the objections noted with respect to the prior art devices; which permits small pieces of metal of similar material to be securely held within cooperating die members; which greatly reduces or eliminates the tendency of small pieces to fall out of the die members prior to the time that the jaw members are brought together, which reduces or eliminates the chances of textile fabrics or similar materials being crushed, cut or torn when they are placed between the jaws of the material; which permits one to carry out a variety of shaping or forming operations because of the variety of dies which can be used therewith.

These and other objects are accomplished by the parts, elements, constructions, arrangements and combinations which comprise the present invention, the nature of which is set forth in the following general statement, preferred embodiments of which are set forth in the following description and illustrated in the accompanying drawings, and which are particularly and distinctly pointed out and set forth in the appended claims forming a part hereof.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in this application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Reference is now made more specifically to the drawings wherein:

FIGURE 1 is a side elevation view of pliers in accordance with this invention;

FIGURE 2 is a fragmentary cross-sectional view taken along one jaw of pliers containing a die member;

FIGURE 3 is a perspective view of a die retaining member;

FIGURES 4, 5, 6 and 7 show top views of retaining members of alternative designs;

FIGURE 8 shows a cross sectional view of a die member having a resilient sleeve attached by one means contemplated in accordance with this invention;

FIGURE 9 shows a top view of the die shown in FIGURE 8;

FIGURE 10 shows a cross sectional view of an alternative die member and resilient sleeve connection;

FIGURE 11 shows a top view of the embodiment shown in FIGURE 10;

FIGURE 12 is a cross sectional view of a die member with a modified form of resilient sleeve;

FIGURE 13 shows a perspective view of an eyelet which may be used in accordance with this invention;

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FIGURES 14, 15, 16 and 17 show cross sectional views of cooperating die members in progressive positional relationship in accordance with the invention;

FIGURES 18, 19, 20, 21, 22, 23 and 24 are fragmentary cross sectional views of other embodiments of the invention;

FIGURE 25 is a partial perspective view of the embodiment shown in FIGURE 24.

An over-all view of a plier-like tool in accordance with this invention is shown in FIGURE 1, wherein the handle portions 10 are shown as being pivotably connected by means 12 to the jaw portions 14 and 16. The numbers 18 and 20 designate in a very general way the location of die elements, and specific details of these elements and features are shown in the remaining figures of the drawing.

FIGURE 2 is a fragmentary sectional view of one jaw of a tool useful in accordance with this invention, together with a die member and means for retaining the die member within the jaw. The jaw comprises an upper section 22 and an end section 24. The upper section 22 is provided with an opening within which is first fitted a retaining member AR. As is shown by both FIGURES 2 and 3, the retaining member AR consists of a flanged upper shoulder portion 26, which together with a lower collar portion 28 serve to lock the retaining member AR within said opening in the upper jaw section 22. An elongated downwardly extending portion 30 of retaining member AR contains a barbed projection 32 which is adapted to engage a corresponding groove 34 in the shank 36 of die member D. The downwardly extending portion 30 of retaining member AR contains an outwardly flared portion 38. It will be noted that the barbed projection 32 does not prevent the insertion of the die member D into the upper section 22 of the jaw J. However, as soon as the die member D is fully inserted, the barbed projection 32 snaps into the groove 34 of the shank 36 by virtue of the resiliency or springiness of downwardly extending portion 30. The die member can thus be locked firmly into place in the jaw of the tool. In order to release and remove the die member one need simply apply finger pressure to outwardly flared portion 38 in order to cause disengagement of the barbed projection 32 and groove 34, while at the same time apply finger pressure upwardly against the bottom of shank 36. With a little practice both of these finger motions can easily be carried out simultaneously with one finger, which is very desirable for those users who may have only one free hand available. The downwardly extending portion 30 is preferably so designed that its inherent springiness and angle of alignment with respect to the sides of shank 36 will cause portion 30 to at all times press firmly up against shank 36 and thus insure a tight fit of die member D within the jaw.

FIGURES 4 and 5 show top views of alternative embodiments of retaining members similar to the retaining members shown in FIGURES 2 and 3. FIGURES 4 and 5 illustrate the variety of ways in which the interior surface of the retaining member can be keyed for the reception of die members containing corresponding projections. The number, shape, size and disposition of the slots on the inner surface of the retaining member and corresponding projections on the outer surface of the die members, the dangers of inserting the wrong die members or inserting the correct die member at an improper angle or inserting a die member in the wrong jaw are minimized. Although the retaining members have been shown as having a circular configuration in FIGURES 3, 4 and 5, they could just as well be square, rectangular or triangular (see FIGURES 6 and 7). Also, instead of having slots in the retaining member and corresponding projections on the die members, this arrangement can be

reversed so as to provide projections on the retaining member and corresponding slots in the die member.

The retaining member can be formed in a number of different ways, as will be obvious to those skilled in the art. In its preferred form it is made so that once it has been installed in the jaw it will remain there permanently. However, if desired, it could be so constructed so as to make its removal and replacement possible (e.g. by being made out of deformable plastic or rubber).

If desired, the retaining member and/or the die member may be given a color or other suitable identifying indicia so that one desiring to insert die members could know at a glance whether or not the die member was supposed to go in the upper or lower jaw (i.e., by giving the die member the same color or identifying indicia as the jaw and retaining member which was to receive it).

The remaining figures of the drawings illustrate various embodiments of the exterior resilient sleeve members.

FIGURES 8-12 illustrate various die members D which are provided with several different types of exterior resilient sleeve members R. These resilient sleeve members are preferably made of a plastic material such as readily compressible polyethylene, vinyl resin or neoprene, although a number of other materials made of natural or synthetic resins or rubber compounds might be used just as well. The precise degree of resiliency is not critical, since it may be varied to suit a particular metal being worked upon, the quality and thickness of the textiles being worked with, etc. For most purposes, a polyethylene having about the same resiliency of flexible polyethylene quarter inch tubing is quite satisfactory. FIGURE 8 in fact shows a die member D having a resilient sleeve member R of generally cylindrical shape which was cut from a length of flexible polyethylene tubing. As shown the lower end 40 of the tubing rests upon a shoulder 42 formed on the exterior side of the die member D. It will be noted that the upper portion 44 of the tubing and particularly the upper edge thereof extends upwardly above the top surface 46 of the die member for a considerable distance, or at least for a noticeable distance. Again, this distance is not critical in that it may vary depending upon the material used for the sleeve R, the size and shape of the die members, the metal being worked upon, the quality and thickness of the textiles being worked with, etc. However, the sleeve R should extend above the sides of the die members in each case, the reason for which will become more apparent when reading the later discussion relative to FIGURES 13-17.

FIGURES 10 and 11 show another embodiment of a resilient sleeve member R which is provided with lower and upper lip members 50 and 52 respectively that are useful in securing the member R to the die member D, which may be desirable in certain instances. FIGURES 10 and 11 also illustrate how the upper edge of member R may have sections thereof cut out so as to present alternating raised and lowered portions 54 and 56. Such raised and lowered portions may be found desirable in order to facilitate the mating of two oppositely disposed die members, or to reduce the cost of the material used or to allow better or more even compression of the resilient members R.

FIGURE 12 illustrates still another embodiment of a resilient member R which is provided with a plurality of grooves or indentations 60 in its outer surface which have often found to be useful in facilitating the compression of the resilient member R.

FIGURE 13 is a perspective view of a well-known one-piece eyelet. FIGURE 14 shows the eyelet E of FIGURE 13 disposed in the lower die member 62 of a pair of die members 62 and 64 and it will be noted that the peripheral edges 66 are in light frictional engagement with the interior sides of the resilient sleeve member 68. In this position then the resilient sleeve member 68

serves to hold the eyelet adjacent to the die member and this function is particularly important when both the lower and upper die members have to hold metal pieces such as eyelets, prong rings, studs, sockets, etc.

FIGURES 15-17 are additional partial sectional views showing the progressive positional relationship of the die members 62 and 64, eyelet E and resilient sleeves 68 and 70 as the die members are brought together and the eyelet forced through and around a sheet of textile material T. In FIGURES 16 and 17 it will be seen that as the die members 62 and 64 are brought together, the eyelet E penetrates the material T and then is formed between the surfaces of the two die members. At the same time that the die members closely approach each other, but before they meet, the upwardly extending edge of member 68 and the downwardly extending edge of member 70 approach each other and press the edges of the textile sheet T between their abutting surfaces (see FIGURE 16). Due to the resiliency or compressibility of members 68 and 70, these members "give" and permit the die members 62 and 64 to continue moving toward each other. The corrugations which often are formed under such circumstances are indicated at 72 and 74 in FIGURES 16 and 17. Of course, as the resilient sleeve member is pressed closer and closer together, the increasing resistance to further compression can serve to prevent complete closure of the die members. Substantial rather than complete closure of the die members is frequently desirable for the reason that complete closure of the metallic die members can often damage portions of the textile material, particularly when portions of the die members contain relatively sharp edges or surfaces. Accordingly, in many plier-like tool arrangements it may be desirable to fix the size and compressibility of the resilient member so that the die members will almost, but not quite, close. In all cases, however, the resilient members must be arranged so that the die members can close to a sufficient extent to properly form or deform the eyelet or other metallic objects placed therebetween.

When the die members 62 and 64 are withdrawn from each other, the resilient members 68 and 70 resume their original shape (as in FIGURES 14 and 15) and the attachment of the eyelet to the textile material is stronger than the force with which the resilient members grip the eyelet, with the result that the eyelet E readily frees itself from die member D.

FIGURE 18 shows another embodiment of the invention wherein die members 62 and 74 and resilient sleeves 68 and 70 cooperate to deform an eyelet E into the desired shape (cloth not shown). The center of die member 62 is provided with an opening through which extends a positioning member 80. As shown the upper portion of positioning member 80 is of a shape and size which will fit within eyelet E. The lower portion of positioning member 80 is more or less in two sections or "split." The purpose of constructing the positioning member in this manner is that the top portion 82 of member 80 is large enough so that it won't pass downwardly through the opening in die member 62, while at the same time the lower ends 84 and 86 of member 80 are normally spread apart far enough so that they will not pass upwardly through the opening in die member 62. However, when the lower ends 84 and 86 are pressed together (as by finger pressure) the entire member 80 can be passed upwardly through the opening in die member 62. One function of member 80 is to center the eyelet E (or any other item) within the die member—which is particularly desirable when the peripheral edges 88 of the eyelet E do not extend into frictional contact with the interior surfaces of resilient sleeves 68 and 70. Member 80 therefore serves as an internal support for items inserted between the die members.

FIGURE 19 is an arrangement which is very similar to FIGURE 18, the main difference being that a ring 90 and stud 92 are positioned between the die members 62

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and 64 rather than an eyelet. This shows that when member 80 is not being used to centrally position an item between the dies, member 80 can be pushed downwardly to its lower extremity where it is out of the way. In this figure, often the die members 62 and 64 have been brought together so as to interfit ring 90 and stud 92, the interfitted parts may be easily pushed from the die members by pushing upwardly on member 80.

FIGURE 20 shows an embodiment of the invention wherein die members 100 and 108 and resilient sleeves 102 and 106 cooperate to deform an eyelet (E) into the desired shape through a portion of the cloth T. The center of die members 100 and 108 are provided with an opening through the axis thereof. In FIGURE 20 the opening 104 is shown to pass completely through the die member 100 and in die member 108 is shown to have a corresponding opening which is threaded and which is adapted to receive a threaded positioning member 110. The upper portion 114 of positioning member 110 is of a shape and size which will fit through the central opening in eyelet (E) and somewhat lower down on member 110 there is a snap supporting ridge 116 which aids in positioning the eyelet (E), the vertical position of ridge 116 is adjustable by virtue of the threaded portion of positioning member 110 and the thumb grip portion 112. The function of positioning member 110 is the same as that noted with respect to FIGURE 18 above. However, it provides the additional advantage of being sufficiently rigidly attached to the die member to cause penetration of the cloth. It therefore provides a post to support and guide the eyelet so that the eyelet will penetrate the material more easily. The threaded exterior of positioning member 110 permits the retraction of said member by merely rotating the thumb grip 112.

FIGURE 21 is very similar to FIGURE 20, the main difference being that a ring 120 and stud 121 are positioned between the die members 100 and 108 rather than an eyelet. This shows that when member 110 is not being used to centrally position an item between the dies, it can be screwed downwardly to its lower (or retracted) position where it is out of the way of the ring 120 and stud 121. The positioning member 110 may also be utilized in conjunction with the ring and stud type of snap to aid the removal of the stud 121 from die member 108 by simply screwing member 110 in an upward direction.

FIGURE 22 illustrates still another embodiment encompassed by this invention. This view shows one jaw of a tool useful in accordance with the invention (similar to the jaw of FIGURES 1 and 2) fitted with a two-part die member and holding member. The jaw comprises an upper section 200 and an end section 201. The upper section 200 is provided with an opening within which is fitted a plastic shank 203. Plastic shank 203 preferably comprises a lower jaw retaining means 204 which is of slightly greater diameter than the jaw opening so that when it is squeezed or distorted slightly and pushed down through said opening it will remain in the position shown during normal use and operation. (Many other equivalent retaining means will readily suggest themselves to those skilled in the art.) The plastic material can be polyethylene, polypropylene or the like and is preferably relatively firm (that is, less firm and rigid than metal but more firm and rigid than soft rubber). Plastic shank 203 comprises a shoulder 205, which, in the particular embodiment shown, can have its lower surface serve as an aid in retaining the shank in place on the jaw 200 and at the same time have its upper surface serve as a support for the bottom of resilient and compressible sleeve member 202. (However, no invention would be involved in having the bottom of the sleeve member 202 rest on the top of jaw 200.) Sleeve member 202 is preferably made of soft rubber and is retained on and around the upper circumference of shank member 203 by its inherent elasticity or if desired by providing a slight indentation 207 slightly below the upper rim portion 206 of the shank

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member into which a corresponding inward extension on sleeve member 202 can fit. Sleeve member 202 can be manually removed if desired. The upper rim 208 of the soft rubber sleeve member preferably extends above the upper surface 211 of the shank member so that a recessed area will be formed for the placement of eyelets and the like. The upper surface 211 may be contoured in any well known manner, if desired.

FIGURE 23 shows another embodiment which is similar to FIGURE 22 and some of the previous embodiments, the main difference being that a single combined shank and resilient sleeve member 221 is provided which is made entirely of soft rubber. The shank portion 222 can be most simply fitted into the opening in the top of jaw 220 by making the diameter of rubber shank 222 just slightly larger than the diameter of said opening and thereafter forcing said shank downwardly through said opening. The shank will remain in place during all normal handling operations. The upper portion of member 221 has a recess for eyelets and the like which is bounded by upstanding lip portions 223 (here shown as being essentially circular in configuration). If desired, lip portions 223 can be treated so that they are more resilient and softer than the shank portion 222.

FIGURES 24 and 25 illustrate still another embodiment of the invention wherein a shank member 230 is fitted into a jaw 231 and a separate metallic (or plastic) resilient member 232 having a plurality of curved partially separated spring fingers "s" is fitted on the portion 233 of the member 230 which is above the jaw surface 231. Member 232 is substantially a continuous strip of metal within the area "a" (with the exception perhaps for one break so that it will have a "split-ring" type of construction) but separates into individual fingers within the area "b." Fingers "s" may be designed to rest upon an upper shoulder 235 if desired. The construction shown in FIGURES 24 and 25 functions in much the same fashion as the previously described embodiments.

In conclusion, while there have been illustrated and described some preferred embodiments of my invention, it is to be understood that since the various details of construction may obviously be varied considerably without really departing from the basic principles and teachings of this invention, I do not limit myself to the precise constructions herein disclosed and the right is specifically reserved to encompass all changes and modifications coming within the scope of the invention as defined in the appended claims.

What is claimed is:

1. An improved plier-like tool comprising in combination:
 - (a) handle portions,
 - (b) jaw portions,
 - (c) pivot means located intermediate said handle and jaw portions,
 - (d) said jaw portions being provided with a pair of cooperating die members,
 - (e) said die members being detachably mounted within said jaw portions,
 - (f) said die members being surrounded by resilient and compressible sleeve members.
2. A tool according to claim 1 wherein each of said die members being constructed of a material which is substantially non-resilient under the conditions normally encountered in the use of the tool, said die members each being closely fitted within an exterior resilient and compressible sleeve member.
3. A tool according to claim 2 wherein said resilient and compressible sleeve members are fitted to said die members so that substantially the entire inwardly extending portions of said resilient sleeve members will contact and be pressed against each other before the inwardly extending surfaces of said substantially non-resilient die members are able to contact each other.

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4. A tool according to claim 2 wherein said resilient sleeve member comprises soft polyethylene.

5. A tool according to claim 1 wherein at least one of said die members has a central opening which houses a slidable positioning member.

6. A tool according to claim 5 wherein said slidable positioning member has a lower split portion which can be compressed together so as to diminish the effective end cross section of the positioning member.

7. A tool according to claim 1 wherein the interior surface of the jaw portion is slotted or keyed for the reception of die members containing slots or keys that will cause the die members to be positioned correctly in relation to one another and in relation to the jaws.

8. A tool according to claim 1 wherein the die members are detachably mounted within the jaw members with the aid of retaining members.

9. A tool according to claim 8 wherein said retaining member consists of a flanged upper shoulder portion, a lower collar portion and a downwardly extending portion which is adapted to be manipulated by manual means in the securing of the die member within the retaining member.

10. A tool according to claim 1 wherein at least one of said die members has a central passageway, at least a portion thereof being threaded and which houses an axially movable, threaded positioning member.

11. A tool according to claim 10 wherein the other of said die members has a central passageway extending at least a sufficient distance to receive the protruding portion

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of said positioning member while at the same time allowing die members to cooperate in their normal operational manner.

12. A tool according to claim 2 wherein said resilient sleeve member comprises neoprene.

13. A tool according to claim 2 wherein said resilient sleeve member comprises a vinyl resin.

14. An improved fastening tool which comprises in combination, handle portions, jaw portions, pivot means located intermediate said handle and jaw portions, said jaw portions being provided with a pair of cooperating die members, at least a portion of each of the die members consisting of resilient and readily compressible material, whereby when said die members are brought toward each other said resilient portions will meet and be compressed together.

15. A tool according to claim 14 wherein said die members are entirely constructed of non-metallic materials selected from the group consisting of plastic and rubber.

16. A tool according to claim 14 wherein at least one of said die members is composed of both plastic and soft rubber components.

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